INTERNATIONAL TECHNOLOGY CORPORATION

OPA

CONFIDENTIAL

RECEIVED

PM SEP -6 PM 2:53

U.S. EPA, REGION VIII
EMERGENCY RESPONSE BRANCH

1634

By _____ Date _____ Subject _____ Sheet No. ____ of ____

Chkd. By ____ Date _____ Proj. No. _____

0.5cm. X 0.5cm.

HAYS,

HERE IS A COPY OF THE LEASE WHICH QUESTAR PROVIDED FOR US TO EXECUTE FOR THE TREATMENT SYSTEM AND THE AREA WHICH IT OCCUPIES. THIS SHOULD PROBABLY BE EXECUTED BETWEEN EPA AND QUESTAR. ANY QUESTIONS, PLEASE CALL.

THANKS

TOM MATHISON

(412) 858-3587

FILE PLAN
99.09.01

CONFIDENTIAL

OPA

QUESTAR PIPELINE COMPANY

79 SOUTH STATE STREET • P. O. BOX 11450 • SALT LAKE CITY, UTAH 84147 • PHONE (801) 530-2400

FACSIMILE TRANSMITTAL

PLEASE DELIVER THE FOLLOWING PAGE(S) TO:

NAME: Tom Mathison

COMPANY: I T Corporation

TELE. NO: (412) 372-7701 FAX NO: (412) 373-7135

TOTAL NO. OF PAGES (including cover page): 12

DELIVERED FROM:

NAME: David Ingleby

TELE. NO: (801) 530-2577 FAX NO: (801) 530-2454

IF ALL PAGES ARE NOT RECEIVED, PLEASE CALL BACK IMMEDIATELY.

REMARKS: Attached is a copy of the proposed lease for the Block Building. Please review and advise @ if acceptable. If it is ok. I will have it executed by QPC and then mail to you for I T's execution.

Thanks

Dave Ingleby

DRAFT 08-23-94

LEASE AGREEMENT

THIS LEASE is entered into this _____ day of _____, 1994, between QUESTAR PIPELINE COMPANY, a Utah corporation (Lessor), 79 South State Street, P.O. Box 11450, Salt Lake City, Utah 84147, and I T CORPORATION, a California corporation (Lessee), 23456 Hawthorne Blvd., Torrance, California 90505. Lessor and Lessee are collectively referred to as the "Parties."

THE PARTIES REPRESENT:

A. Lessor owns commercial real estate at 1601 East 1700 South, Naples, Utah.

B. Lessee has a contract with The Army Corp of Engineers to clean up an underground hydrocarbon spill in the vicinity.

C. Lessee requires space on Lessor's property to construct a 16' x 40' block building to house pumps and auxiliary equipment necessary for the clean-up project, and requires space to install several process/storage tanks (Premises).

D. The Parties desire to enter into this Lease for their mutual benefit.

THE PARTIES AGREE AS FOLLOWS:

1. *Premises:* Lessor shall lease to the Lessee the parcel depicted on Exhibit "A."

2. *Improvements:* Lessee is authorized to construct a 16' x 40' block building to house the electric pumps and control equipment and place process/storage tanks on the Premises. This equipment shall be installed and operated in accordance with all applicable federal, state and local regulations, codes and standards. Lessee shall also fence the Premises as shown on Exhibit "A" after consulting with Lessor. The location of the building, tanks and fencing shall be coordinated with Lessor's District Manager, Stan Fabian at (801) 789-1272.

3. *Term:* The term of this Lease shall commence on the effective date and continue for a term of three years and year-to-year thereafter until completion of the project. Either Party may terminate this Lease at any time by giving the other Party 30 days' written notice delivered by certified mail to the address specified in Paragraph 14.

4. *Rent:* Rent shall be Ten Dollars ($10.00) for the term of the Lease.

5. *Use:* Lessee shall obtain all necessary licenses and permits. The Premises and building shall be used by Lessee to house the pumps and control equipment only. No other equipment or material may be stored on the Premises. Lessee shall be responsible for proper handling, storage and disposal of any toxic waste or hazardous material in accordance with all applicable state and federal regulations. Lessee shall keep the Premises clean and orderly at all times. Failure to abide by the terms of this Article is grounds for immediate termination of this Lease.

6. *Security:* Lessee shall "fence out" the Premises as shown on Exhibit "A." Prior to commencement of any construction and within 30 days after execution of this Lease, Lessee shall provide Lessor with a plot plan designating the final location of the block building, tanks, equipment, fencing and gates. Fencing shall be of the same size and type as the fencing currently in place on Lessor's property. Lessor and Lessee shall mutually agree on the location of all improvements before installation.

Lessee's entry on the balance of Lessor's lands (Main Yard) shall be on foot only, for the sole purpose of checking wells. Entry shall be through a "man-gate" to be constructed through the fencing at a location mutually agreed upon by Lessor and Lessee. Vehicle entry to the Main Yard shall be by permission only. Lessee or its subcontractors shall register at Lessor's office during business hours

prior to vehicle entry. Lessee shall notify Lessor 24 hours in advance of any major work in the Main Yard.

7. *Subcontractors of Lessee:* Lessee agrees that all of its subcontractors shall be bound by the terms and conditions of this Lease and will include appropriate language in its contracts with subcontractors. Lessee shall pay its employees and ensure that all subcontractors pay their employees in accordance with the provisions of Utah Code Ann. §§ 34-28-1 to 18 (1974). In the event that Lessee shall fail to comply with this provision, Lessor shall have the right to collect upon the Lessee's labor payment bond in order to satisfy any claims for wages initiated against Lessor.

8. *Bond:* Lessee shall obtain at its sole expense a performance and payment bond guaranteeing the full performance of all obligations arising under this Lease, the payment of applicable federal and state taxes and the payment of all suppliers of labor and materials. The bond shall be issued by a corporate surety authorized to do business in Utah and acceptable to the Treasurer of the United States as indicated in Treasury Circular 570. The bond shall be in a form acceptable to Lessor.

9. *Utilities:* The Lessee shall be responsible for the payment of all utilities and services, including any hookup or connection fees.

10. *Assignment and Subletting:* This Lease shall not be assigned or sublet without the written consent of the Lessor. Lessee may allow use of the Premises by its subcontractors, but such use shall not relieve Lessee of its obligations under this Lease.

11. *Indemnification and Insurance:* Lessee assumes the risk of all liability, damage, costs, suits, claims and causes of action, including attorney's fees (Liabilities), and agrees to release, indemnify, defend and hold harmless the Lessor, its officers, directors, agents, employees, corporate parents, affiliates and subsidiaries (the Indemnified Parties) from all Liabilities arising from the operations, fault, neglect or actions of the Lessee, its employees, agents and subcontractors on the Premises. Without limiting any of the other obligations or liabilities of the Lessee under this Lease, Lessee shall maintain and shall require all its subcontractors to maintain insurance coverage as stated below and on the certificate of insurance that is attached as Exhibit B and incorporated by this reference. The certificate of insurance shall be properly completed and signed by a duly authorized representative or officer of Lessee's insurance company without alteration, modification or addition excepting the insertion of policy information in the spaces provided. The completion and proper execution of the certificate is a condition precedent to the placement of any facilities on the Premises. If any of the policies described and identified in the certificate expire or otherwise terminate during the term of this Lease, Lessee must replace the policies before the expiration date with policies giving the same or

comparable coverage which meets Lessor's approval. A new certificate in the same form and for the same or approved coverage and liability limits stated on the attached certificate must be executed by Lessee's insurer and filed with Lessor. The filing of the new certificate is a condition precedent to Lessee's continued use of the Premises.

If any insurance required of Lessee or its subcontractors is written on a claims made basis, for a period of 6 years from the completion of the work contemplated by this Lease, Lessee shall:

a. Maintain a retroactive date that at a minimum dates back to the inception of the Lease;

b. Use all reasonable efforts to maintain insurance limits undepleted by losses or reserves for anticipated losses in the minimum amounts specified in this Lease; and

c. Maintain an extended reporting period rider which at a minimum dates back to the inception of this Lease if the claims made insurance is cancelled, not renewed or renewed on a basis other than claims made.

12. *Default:* If Lessee fails to comply with any of the other terms of this Lease, Lessor shall give Lessee 30 days' notice of its intention to terminate the Lease. If Lessee does not cure any defaults and complies with terms of the Lease within the 30-day period, the Lease shall terminate.

13. *Termination:* Upon termination, Lessee agrees to immediately surrender possession of the Premises, remove the tanks and remediation equipment from the building within 30 days and leave the Premises in good order and condition. Any equipment remaining on the Premises after the expiration of 30 days shall become the property of Lessor. Upon termination of this Lease the block building shall become the property of Lessor at no cost to Lessor. Lessee shall provide Lessor with a suitable Bill or Sale evidencing transfer of title.

14. *Notice:* Notices shall be sent to the following:

Lessor: Questar Pipeline Company
c/o David Ingleby
P.O. Box 11450
Salt Lake City, UT 84147

Lessee: I T Corporation
c/o Tom Mathison
2790 Mosside Boulevard
Monroeville, PA 15146

THIS LEASE is executed by the authorized representatives of the Parties and shall be effective on the day and year first above written.

LESSOR:
QUESTAR PIPELINE COMPANY

By _____
G. W. DeBernardi, Vice President
Engineering and Transmission Services

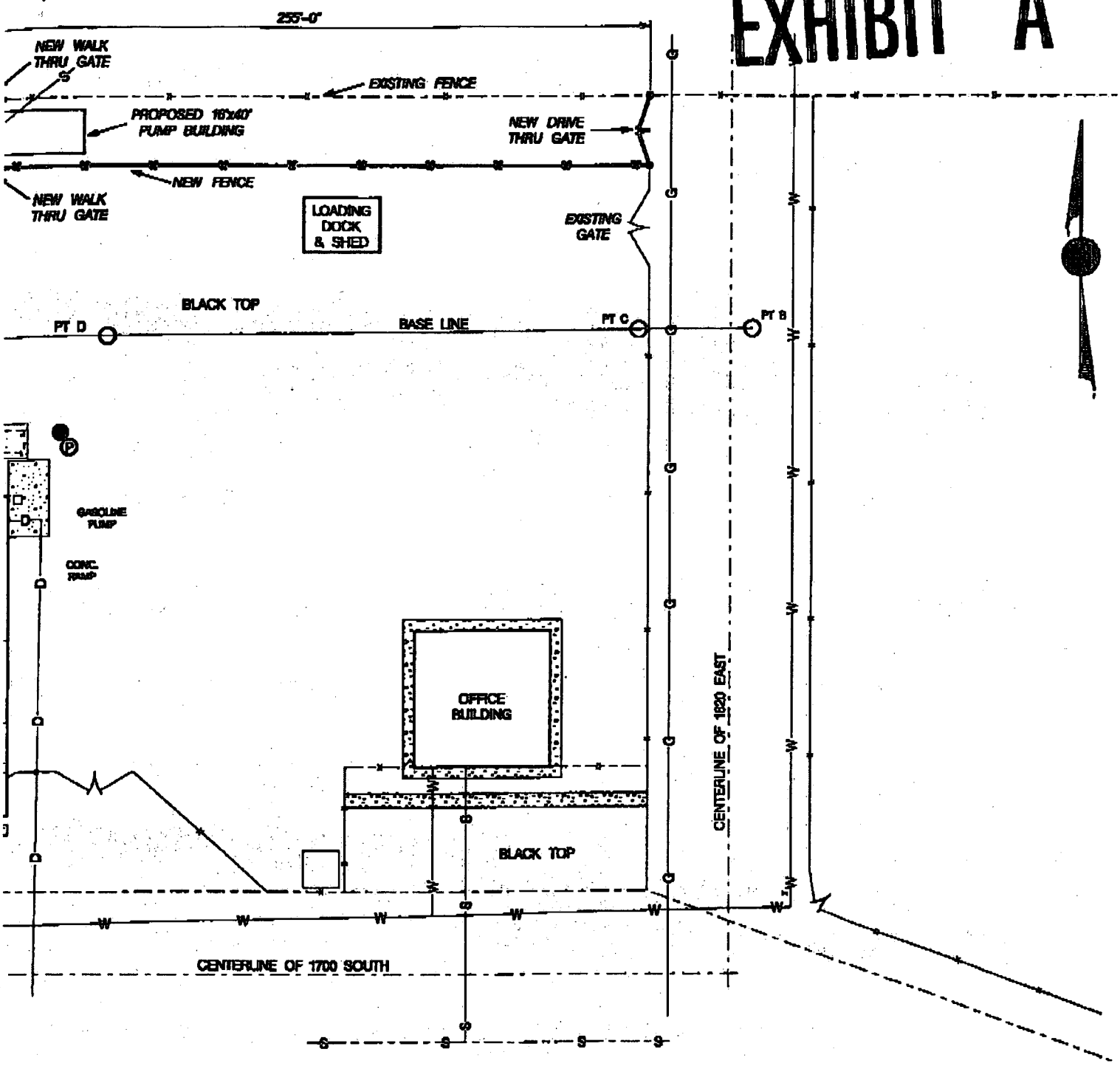
LESSEE:
I T CORPORATION

By _____ EWR

_____
(please type name and title)

R94-005\IT.KLS

EXHIBIT "A"



ENGINEERING RECORD		
W.O.	OPERATIONS	
DRAWN 8-4-94 km	CORROSION	
SURVEYED	49CFR PART 192	
CHECKED	FOR CONSTRUCTION	
PROJECT ENGINEER	SECTION 31 T. 4 S	R. 22 E
APPROVED	COUNTY UINTAH	STATE UT

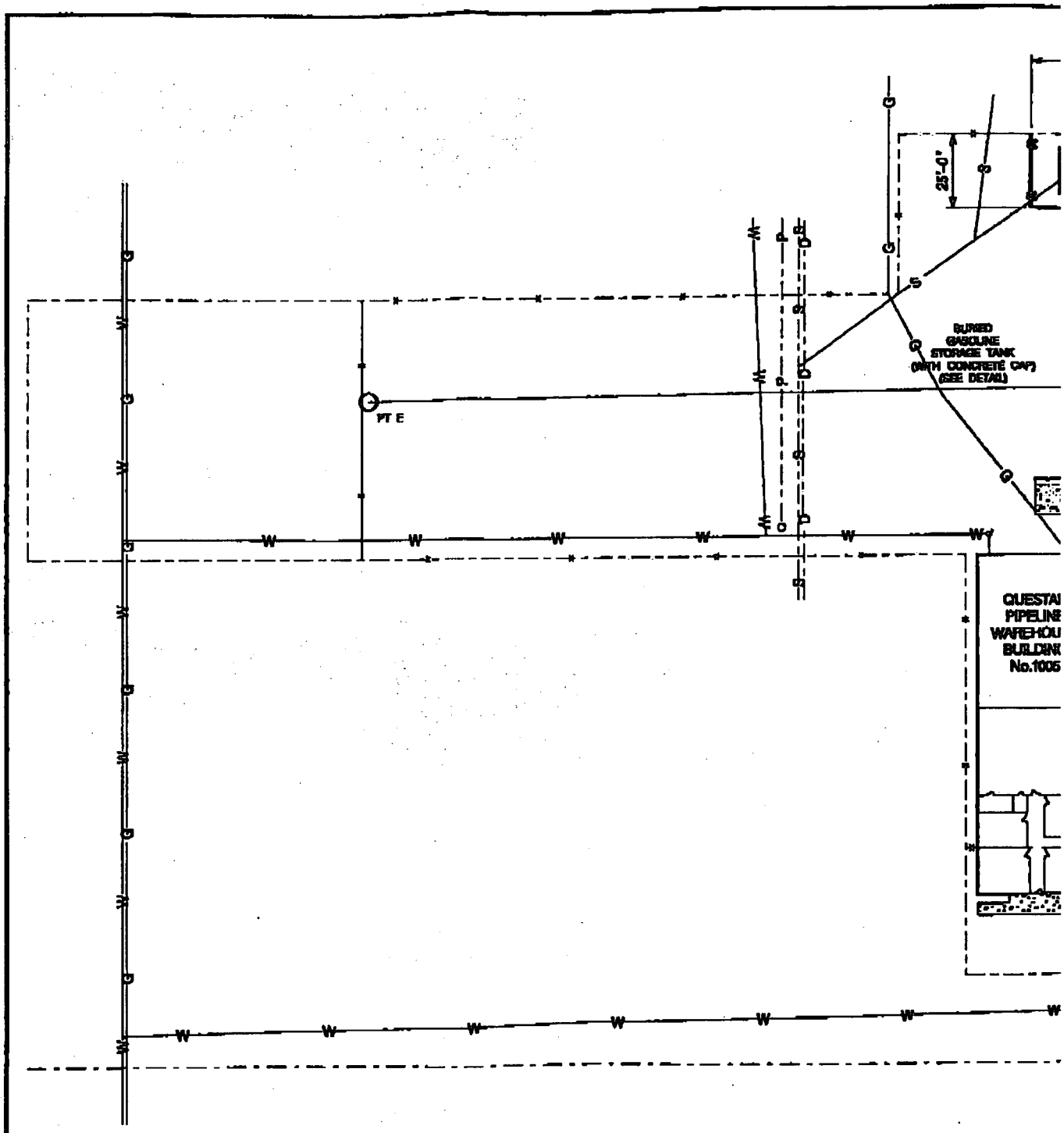
REVISIONS

NO.	DESCRIPTION	DATE/BY

QUESTAR PIPELINE COMPANY

SITE PLAN VERNAL YARD

SCALE:	DRWG. NO.
1" = 50'	32730 B



GENERAL PLAN

CERTIFICATE OF INSURANCE

TO: Questar Pipeline Company
P. O. Box 11150
180 East First South
Salt Lake City, Utah 84147
ATTENTION: Insurance Department

Exhibit/Attachment "B" to the LEASE AGREEMENT dated _____, between Questar Pipeline Company and I T Corporation.

PRODUCER:	COMPANIES AFFORDING COVERAGE	BEST'S KEY RATING
Contact:	Company Letter A	
Telephone No: Fax No:	Company Letter B	
	Company Letter C	
	Company Letter D	

INSURED:
I T CORPORATION

The insuring company is aware that I T Corporation shall perform its operations in the state(s) of Utah

Co. Ltr.	Type of Insurance	Policy Number	Policy Effective	Policy Expires	Limits of Liability	
	GENERAL LIABILITY ☒ Commercial General Liability ☐ Claims Made ☒ Occurrence Includes: Premises Operations Independent Contractors Products Completed Operations (extending 1 year after completion of operations) Personal Injury (with employee exclusion deleted) Broad Form Contractual Broad Form Property Damage ☒ Explosion, Collapse & Underground Hazards (XCU) ☐ Blowout & Cratering ☐ Underground Resources & Equipment ☐ Pollution Liability (Sudden & Accidental/Gradual) ☐ Other:				Each Occurrence General Aggregate Products/Completed Ops Aggregate Personal & Adv. Injury Fire Damage (Any one fire) Medical Exp. (Any one person) Self Insured Retention/Deductible Sublimits (If applicable):	$ 5,000,000 $ 5,000,000 $ 5,000,000 $ 5,000,000 $ $ $ $ $ $
	☐ Professional Liability/Errors & Omissions, Including Contractual				Each Occurrence $	Aggregate $
	AUTOMOBILE LIABILITY ☐ Any Auto ☒ All Owned Autos ☐ Scheduled Autos ☒ Hired Autos ☒ Non-Owned Autos ☐ Pollution Liability (Sudden & Accidental)				Combined Single Limit Bodily Injury (Per Person) Bodily Injury (Per Accident) Property Damage	$ 1,000,000 $ $ $
	☐ EXCESS LIABILITY ☐ Umbrella Form				Each Occurrence $	Aggregate $
	WORKERS' COMPENSATION ☒ Standard Workers' Compensation ☒ Employers' Liability ☐ Voluntary Compensation ☐ Employers' Liability Stop-Gap Endorsement ☐ Other:				STATUTORY $ 500,000 Each Accident $ 500,000 (Disease - Policy Limit) $ 500,000 (Disease - Each Employee)	
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS
Lease of Questar Pipeline Company's property located at 1601 East 1700 South, Naples, Utah, to perform work under a contract with Army Corp. of Engineers to clean up an underground hydrocarbon spill in the vicinity.

Limits of liability required above may be satisfied with a combination of primary and excess liability policies.

(A) Each policy cited above contains a provision that the policy shall not be cancelled or materially changed without thirty (30) days' prior written notice to Questar Pipeline Company.

(B) Contractual obligations contained in the agreement mentioned above are covered under the Contractual Liability insurance cited above subject to all terms and conditions, limitations and other provisions of the policy except with respect to Workers' Compensation.

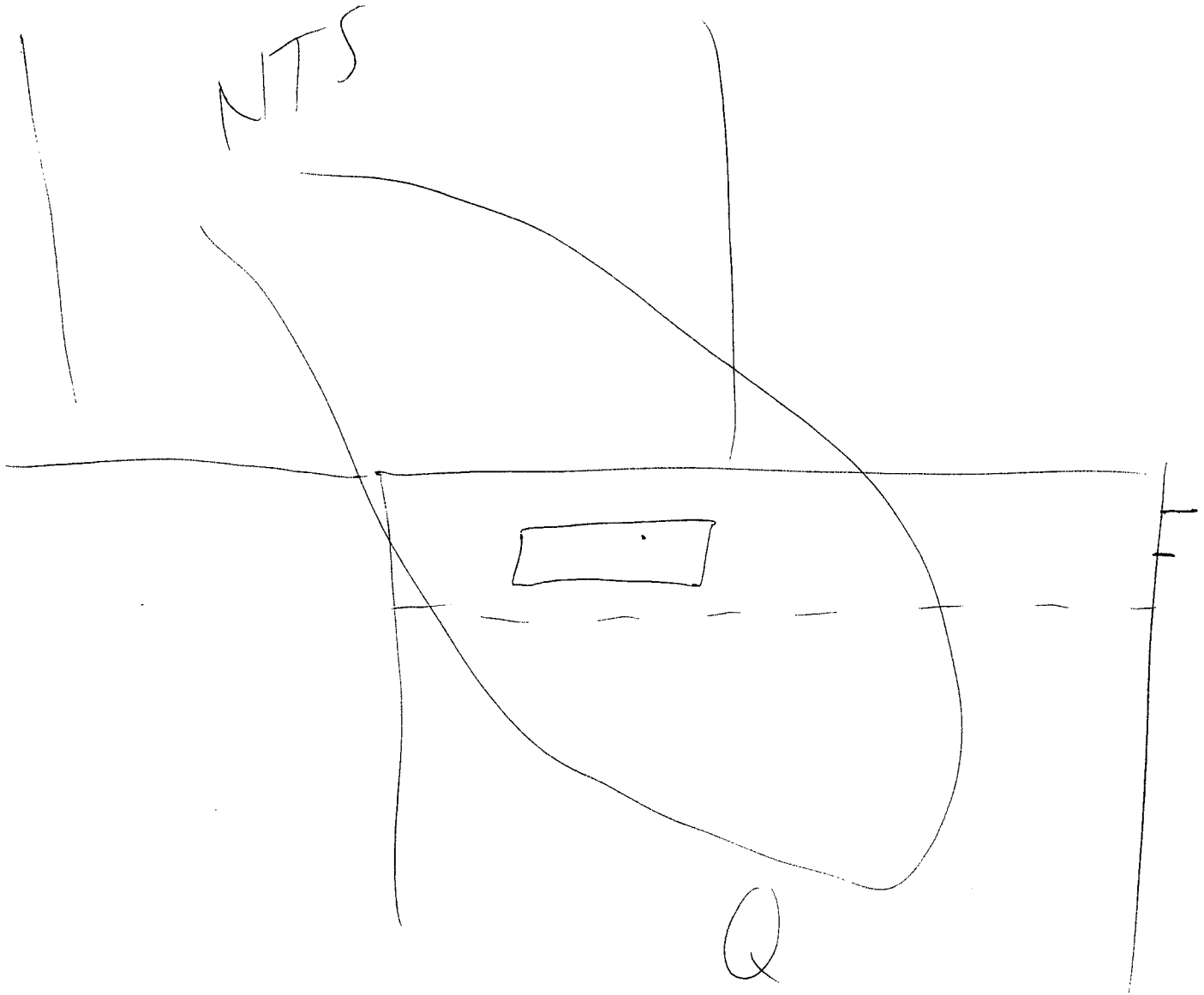
(C) The right of subrogation against Questar Pipeline Company, its parent or any of its subsidiaries and/or affiliated companies and any of the directors, officers, agents and/or employees of such Companies is waived in each of the policies listed above.

(D) Questar Pipeline Company, including all of its directors, officers, agents and employees acting on its behalf, is listed as an additional insured on each of the policies listed above, except Workers' Compensation, but, only with respect to the work being performed by the Insured on behalf of Questar Pipeline Company.

(E) The insurance afforded to Questar Pipeline Company as an additional insured is primary coverage and applies to the full policy limits prior to any other insurance coverages, including any applicable self-insured retentions or deductibles which Questar Pipeline Company, its parent or any of its subsidiaries and/or affiliated companies, if applicable, may have in the event of a claim made against any of the policies listed above.

Upon written request by Questar Pipeline Company, the Insured will furnish a copy of any policy cited above, certified by the Insurance Company to be a true and complete copy of the original.

(01-93) Authorized Representative Date


NTS
Q

BTEX REMOVAL CALCULATIONS

Basic Formula

$$Removal = (Influent \frac{ug}{L} - Effluent \frac{ug}{L}) \times \frac{1\,mg}{1{,}000\,ug} \times \frac{pump}{rate} \times \frac{3.785\,L}{gallon} \times \frac{60\ minutes}{hour} \times \frac{\%\ time\ pumps\ run}{100}$$

Site #1P 6/29/93
Influent 125 Total BTEX — *75% time pumps run*
Effluent <5 Total BTEX
3 hours time through tank

$$= (125 \frac{ug}{L} - 5 \frac{ug}{L}) \times \frac{1\,mg}{1{,}000\,ug} \times \frac{60\ gallons}{minute} \times \frac{3.785\,L}{gallon} \times \frac{60\ minutes}{hour} \times (.75)$$

= 1,226 mg/hour → 1.23 g/hour → 29.4 g/day Total BTEX
↓
882 g/day Total BTEX
↓
10.7 kg/ year Total BTEX

Site #1P 3/9/93
Influent 932 ug/L Total BTEX — *75% time pumps run*
Effluent 48 ug/L Total BTEX

$$= (932 \frac{ug}{L} - 48 \frac{ug}{L}) \times \frac{1\,mg}{1{,}000\,ug} \times \frac{60\ gallons}{minute} \times \frac{3.785\,L}{gallon} \times \frac{60\ minutes}{hour} \times (.75)$$

Removal Rate = 9,034 mg/hour Total BTEX
9.0 g/hour Total BTEX
217 g/day
6.5 kg/month
79 kg/year

Site #2C 3/3/93
Influent 57,612 ug/L Total BTEX — *50% time pumps run*
Effluent 2,250 ug/L Total BTEX

$$= (57{,}612 \frac{ug}{L} - 2{,}250 \frac{ug}{L}) \times \frac{1\,mg}{1{,}000\,ug} \times \frac{60\ gallons}{minute} \times \frac{3.785\,L}{gallon} \times \frac{60\ minutes}{hour} \times (.50) =$$

377,181 mg/hour Total BTEX
↓
377 g/hour Total BTEX
↓
9.052 kg/day 272 kg/month
↓
3,304 kg/year

Printed: 03/23/94 Job No.: 519063

INTERNATIONAL TECHNOLOGY CORPORATION
NAPLES TRUCK STOP DO#88
VERNAL, UTAH
Job to Date Budget Variance Report (As of 03/23/94)

Task Number	Task Description	Current Budget	Spent To Date	Estimate Costs to Complete	Estimated Final Costs	(Overruns) or Underruns	Project Completi %
00101001	MOBILIZATION/ DEMOBILIZATION	20,029	12,602	10,014	22,617	(2,588)	50
00201001	SITE VISIT / PLAN/SCOPE	2,131	2,223	0	2,223	(92)	100
00202001	WELL INSTALLATION	33,080	22,627	0	22,627	10,452	100
00202002	DESIGN/PROJECT PLANNING	8,622	4,279	0	4,279	4,342	100
00203001	PUMP TESTS/PILOT/REMEDIAL	78,900	32,079	23,670	55,749	23,150	70
00203002	EXCAVATION/BACKFILL TRENCHES	11,610	7,293	2,322	9,615	1,994	80
00203003	ASPHALT PACHING	12,771	0	12,771	12,771	0	0
00203004	BIO PILOT STUDY	3,000	0	3,000	3,000	0	0
00301001	PERDIEM & LODGING	6,803	4,287	2,721	7,008	(205)	60
00401001	INTERIM REPORT	3,168	0	3,168	3,168	0	0
	TOTAL	180,114	85,394	57,666	143,061		
	FEE	17,468			17,468		
	FINAL COSTS	197,582			160,529	37,052	Underrun

Printed: 03/23/94 Job No.: 519063

INTERNATIONAL TECHNOLOGY CORPORATION
NAPLES TRUCK STOP DO#88
VERNAL, UTAH
Job to Date Cost Report (As of 03/23/94)

Task Number	Task Description	Personnel Costs	Equipment Costs	Material Costs	Per Diem Costs	Subcontract Costs	Analytical Costs	Total Costs
00101001	MOBILIZATION/ DEMOBILIZATION	5,138	0	7,464	0	0	0	12,602
00201001	SITE VISIT / PLAN/SCOPE	1,877	345	0	0	0	0	2,223
00202001	WELL INSTALLATION	8,426	2,733	1,720	0	9,747	0	22,627
00202002	DESIGN/PROJECT PLANNING	4,279	0	0	0	0	0	4,279
00203001	PUMP TESTS/PILOT/REMEDIAL	8,312	16,020	7,746	0	0	0	32,079
00203002	EXCAVATION/BACKFILL TRENCHES	0	0	0	0	7,293	0	7,293
00203003	ASPHALT PACHING	0	0	0	0	0	0	
00203004	BIO PILOT STUDY	0	0	0	0	0	0	
00301001	PERDIEM & LODGING	0	0	0	4,287	0	0	4,287
00401001	INTERIM REPORT	0	0	0	0	0	0	
	TOTAL	28,035	19,099	16,931	4,287	17,040	0	85,394

801 789 1134

Printed: 04/11/94

Job No.: 519063

INTERNATIONAL TECHNOLOGY CORPORATION
NAPLES TRUCK STOP DO#89
VERNAL, UTAH
Job to Date Budget Variance Report (As of 04/11/94)

Task Number	Task Description	Current Budget	Spent To Date	Estimate Costs to Complete	Estimated Final Costs	(Overruns) or Underruns	Project Completion %
00101001	MOBILIZATION/ DEMOBILIZATION	20,029	15,288	10,014	25,302	(5,273)	50
00201001	SITE VISIT / PLAN/SCOPE	2,131	2,239	0	2,239	(108)	100
00202001	WELL INSTALLATION	33,080	27,372	0	27,372	5,707	100
00202002	DESIGN/PROJECT PLANNING	8,622	6,098	0	6,098	2,523	100
00203001	PUMP TESTS/PILOT/REMEDIAL	103,900	78,495	31,170	109,665	(5,765)	70
00203002	EXCAVATION/BACKFILL TRENCHES	33,610	14,927	6,722	21,649	11,960	80
00203003	ASPHALT PACHING	37,771	0	37,771	37,771	0	0
00203004	BIO PILOT STUDY	3,000	0	3,000	3,000	0	0
00301001	PERDIEM & LODGING	6,803	6,891	2,721	9,612	(2,809)	60
00401001	INTERIM REPORT	3,168	0	3,168	3,168	0	0
00501001	ANALYTICAL	4,000	0	4,000	4,000	0	0
00601001	LAND FARM	3,000	0	3,000	3,000	0	0
00701001	FRAC TANKS	12,600	12,429	0	12,429	170	100
00801001	PROJECT SUPPORT	0	4,369	0	4,369	(4,369)	0
	TOTAL	271,714	168,111	101,566	269,678		
	FEE	27,171			27,171		
	FINAL COSTS	298,885			296,849	2,035	Underrun

INTERNATIONAL TECHNOLOGY CORPORATION
NAPLES TRUCK STOP DO#88
VERNAL, UTAH
Job to Date Budget Variance Report (As of 05/02/94)

Task Number	Task Description	Current Budget	Spent To Date	Estimate Costs to Complete	Estimated Final Costs	(Overruns) or Underruns	Project Completion %
00101001	MOBILIZATION/ DEMOBILIZATION	24,600	22,279	2,312	24,592	7	90
00201001	SITE VISIT / PLAN/SCOPE	3,579	3,579	0	3,579	(0)	100
00202001	WELL INSTALLATION	25,552	25,552	0	25,552	(0)	100
00202002	DESIGN/PROJECT PLANNING	8,292	8,292	0	8,292	(0)	100
00203001	PUMP TESTS/PILOT/REMEDIAL	108,408	65,394	13,008	78,403	30,004	88
00203002	EXCAVATION/BACKFILL TRENCHES	17,078	17,078	0	17,078	(0)	100
00203003	ASPHALT PACHING	14,517	14,518	0	14,518	(1)	100
00203004	BIO PILOT STUDY	3,000	0	0	0	3,000	100
00301001	PERDIEM & LODGING	11,457	9,557	1,901	11,459	(2)	83
00401001	INTERIM REPORT	6,796	6,796	0	6,796	(0)	100
00501001	ANALYTICAL	4,683	2,983	1,699	4,683	(0)	63
00601001	LAND FARM	2,174	1,574	600	2,174	(0)	72
00701001	FRAC TANKS	13,500	6,699	6,750	13,449	50	50
00801001	SITE ADMIN & SUPPORT	60,000	28,751	24,180	52,931	7,068	59
00901001	Exterior Electric	30,000	5,694	24,360	30,054	(54)	18
01001001	BIO-REMEDIATION	30,000	23,339	6,690	30,029	(29)	77
	TOTAL	363,636	242,092	81,503	323,595		
	FEE	36,363			36,363		
	FINAL COSTS	399,999			359,958	40,040	Underrun

[16] From: JOHN GIEDT at R8HWM1 10/5/94 12:36PM (2280 bytes: 37 ln)
To: Royal Nadeau at DCOERR1, HAYS GRISWOLD, CHERYL CRISLER, JIM KNOY
Subject: Re: RRT review of the Naples Truck Stop bioremediation
---------- Message Contents ----------

Royal, I need to defer your questions to Hays. During the Vernal mtg, the Omaha COE indicated that they were transferring their role to the Sacramento COE office in Nov, which was represented by both a COE and another contractor (who I don't recall)

Thanks for your continued support. Your comment that the system ought to work confirms my and Hays' position that it is probably time to run the bioremediation plan thru the RRT for its review/approval - per mandatory NCP requirements. While it was your contractor who developed the RRT/8 bioremediation guidance, I was still of the mis-impression that it was primarily related to insitu cleanup.

It is an intriguing innovative technology, albeit very complicated and expensive for such a confined and small release.

GIEDT

JOHN, WHO IS THE GROUP THAT IT IS TURNING THE RECOVERY OPERATIONS TO? I GUESS I MUST HAVE BEEN OUT OF THE ROOM WHEN THAT CAME UP. I WAS UNDER THE IMPRESSION THAT IT WAS STILL VERY MUCH IN THE PICTURE IN TERMS OF THE OPERATION OF THE VEP AND BIOREMEDIATION EFFOR IN TERMS OF EQUIPMENT O&M
WHAT IS IT THAT YOU WOULD LIKE FROM ME IN THE INTERIM?
I HAVE PASSED THE IT INTERIM REPORT TO HARRY ALLEN. WE BOTH GAVE IT A CURSORY EXAM IN TERMS OF THE SETUP AND DATA PACKAGE. BARRING MURPHY'S LAW, THE PROPOSED SYSTEM LOOKS LIKE IT WILL WORK (AT LEAST) ON PAPER.
I WOULD LIKE TO MONITOR THE PROJECT AS IT HAS PROMISE FOR FUTURE SITUATIONS IN OTHER PARTS OF THE COUNTRY ALBEIT THE QUESAR SITE MAY BE OPTIMAL FOR VACUUM RECOVERY.

TELEFAX COVER SHEET

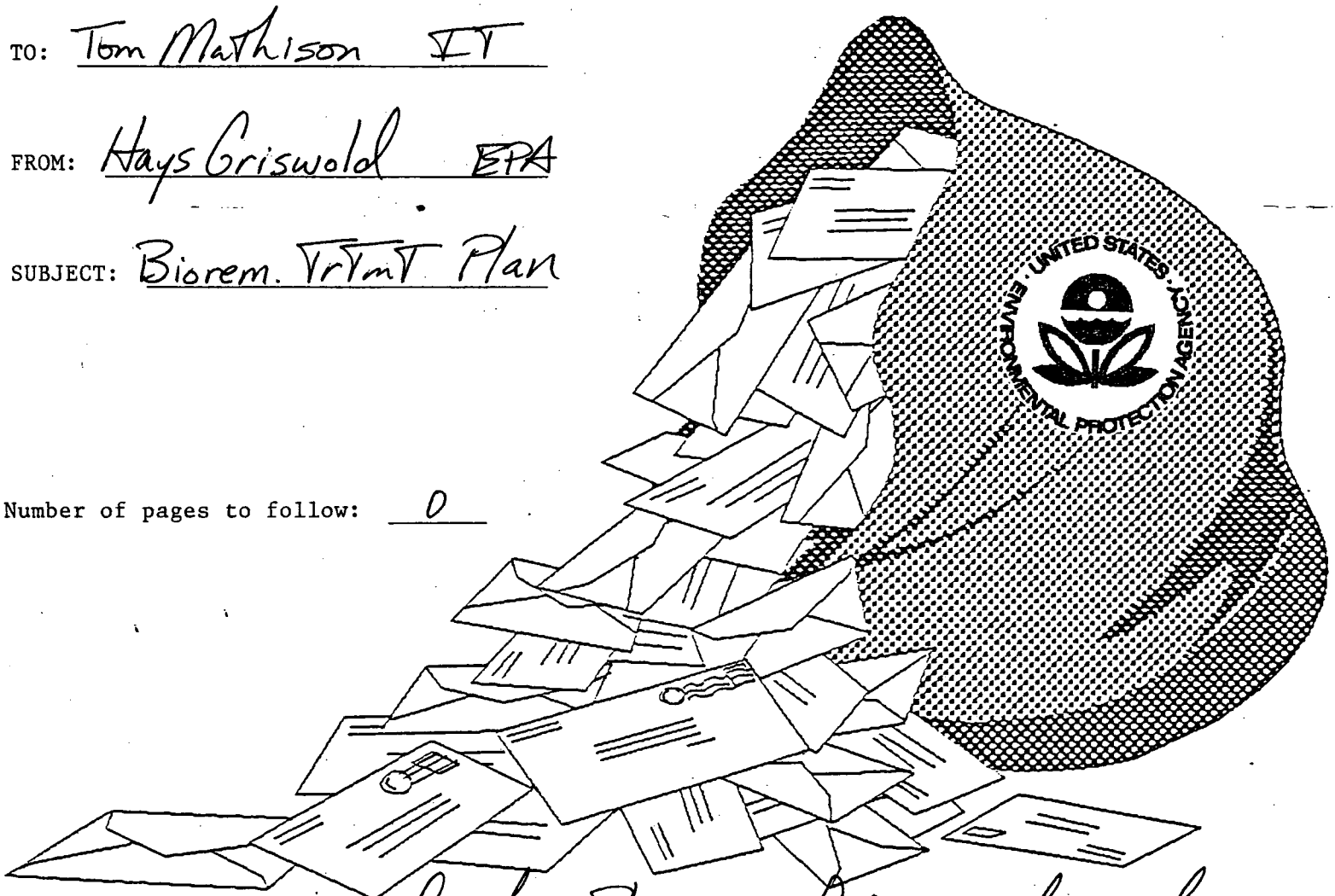
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

-- Emergency Response Branch --

TO: Tom Mathison IT

FROM: Hays Griswold EPA

SUBJECT: Biorem. Trtmt Plan



Number of pages to follow: 0

COMMENTS:
In general the Plan is fine and needs no changes. However, I ask for an addition. Please, name the key microbes and the fact that they are on the EPA approved list (as I remember - if I remember right) Thanks Hays

Please call (303) 294-7081 if you have any problems.

Our return fax number is (303) 294-7168. Thank you.

[11] From: JOHN GIEDT at R8HWM1 10/4/94 5:11PM (1203 bytes: 20 ln)
To: HAYS GRISWOLD, CHERYL CRISLER, JIM KNOY, Royal Nadeau at DCOERR1
Subject: RRT review of the Naples Truck Stop bioremediation
---------- Message Contents ----------

Initially, I had thought that RRT approval of OPA cleanups involving bioremediation were focused on insitu site work.

Now that it has been clarified that the Naples Truck Stop bioremediation reactor is also applicable to the NCP regulation, I have advised Hays that we need to comply with our own rules. He was already aware of that, and was awaiting some evaluation results from Royal Nadeau. However, since we are rapidly approaching the time for IT to turn the operations over to another group, we need to get the RRT review and approval.

I asked Hays to pull together IT's proposal and submit it to me, Co-Chair of the RRT. I'll have Knoy assemble the RRT reviewers, probably EPA, DOI, USFS, and State of Utah.

I welcome your comments.

GIEDT

[5] From: CHERYL CRISLER 6/15/94 2:14PM (10999 bytes: 197 ln)
To: STEVEN WAY, MIKE ZIMMERMAN, DAVID CHRISTENSON, HAYS GRISWOLD, TIEN NGUYEN, SARAH PERHAM, JOYCE ACKERMAN, STEVE HAWTHORN, PETER STEVENSON, CHERYL CRISLER
cc: JOHN GIEDT, VICKI FERGUSON
Subject: Meeting with USACE
---------- Message Contents ----------

Met with the Omaha COE folks regarding COE support to EPA removal actions.
COE attendees included:

Rick WIlson, Rapid Response Program Manager
Miguel Cintron, Chief, Superfund Section
Will Bonneau, Chief, Rapid Response Section
Steve Rasmussen, Rapid Response Resident Engineer
Ron Witcoski, Rapid Response Contracting Officer
Doug Plack

We discussed: 1) COE's immediate response, rapid response capabilities and preplaced contracts
2) Definitized and undefinitized contract actions, ie rapid vs. immediate response
3) contracting officer authority and guidelines for directing the contractor
4) funding procedures for IAGs and PRFAs
5) Omaha District Organization and chain of command
6) EPA and COE interatction, issues on sites to date.

I would like to make the point prior to describing key discussion issues, that it does not appear realistic for EPA OSCs to rely on the COE for any type of emergency or immediate response support. Even though the COE has an "immediate response" capability, that phrase means something different to the COE from what it means to EPA OSCs. The COE and their contractor may be able to show up on site on site w/i 72 hours, but they can not perform emergency actions. So we should continue to meet the need for immediate on site response actions through another mechanism e.g. ERCS or a BOA.

The COE can respond to TCRAs using their rapid or immediate response contracts. They prefer to have planning time. (Rapid response allows that). If you want are considering using the COE at a particular site, but you would like to discuss the specifics of the site and which contract mechanism the COE would use, with the COE prior to initiating a work authorization, IAG or PRFA, the COE is available for these kinds of discussions. (Also don't forget that we have the umbrella IAG with the COE.

The following identifies some of the points/issues discussed during the joint meeting. But, the primary purpose is to provide you information regarding how to proceed or what to expect should you choose to use the COE to support an Oil or CERCLA Response.

The following information and guidance is not organized in any particular fashion, so I hope it isn't confusing.

1. Even though there is an umbrella IAG in place with the Missouri River Division (MRD) (all EPA CERCLA IAGs are with MRD) the OSC still has to submit the one page request for COE to provide support to EPA. (Rick discussed this step when he met with OSCs -this is not a new step.) This is necessary for the COE to evaluate their available resources prior to commiting to a response, and it will provide the substantiation that the response is time critical.

2. Each request must be PEP'd by the COE. This means a panel consisting of Will Bonneau (Rapid Response) and Steve Rasmussen (Construction) must consult to determine, as described above, that the COE has sufficient available resources before committing to the project; and the response must be "time critical". Currently Steve has 11 on-site construction managers who could support EPA removals.

3. Currently 30% of the COE's rapid response capability is committed to EPA.

4. The COE prefers to use their rapid response contract mechanism, instead of their immediate response contract, when responding to EPA. Using the rapid response mechanism can get COE design and construction staff on site to support the OSC.

5. Rapid responses have definitized scope of work. An immediate response is executed as an undefinitized contract action, no known solution or remedy. It is possible for the OSC to initiate COE support believing the rapid response contract will be used, but when the COE project officer gets on site, re-evaluate and change to immediate, or vice versa.

6. The COE agreed they could have engineer/design staff on site, as needed by the OSC. Typically, the engineer/design staff spends most of their time in the Omaha office utilizing COE support staff. However, they are willing to deviate from this typical procedure, if site conditions warrant and the OSC feels that this type of on site COE presence is necessary.

7. There are three primary contacts within the COE for the removal program. When support is being initiated using a PRFA or IAG, or there is a question/issue regarding one of these mechanism, Rick Wilson is the contact.

Engineering/design work is handled by the Rapid Response Section. WIll Bonneau is the Section Chief and primary contact until one of his project managers is assigned to a site. This group is involved only until the engineering/design is completed.

Once the scope of work is definitized and work moves into the construction phase, Steve Rasmussen , residnet engineer is responsible and will assign a construction project manager. This individual will be the primary contact for the OSC.

When using the COE rapid response contract, the on site COE construction project manager will not generally be on

site as the key COE representative until the engineering/design work is completed and ready for construction. If both an engineering/design project manager and a construction project manager is on site, the latter will be the long term OSC contact.

8. The COE is very conservative regarding safety issues. They will react in accordance with their Department requirements and protocol.

9. Cost of using the COE - 14-20%.

a. 10% of the amount obligated for construction is taken off the top by the COE. It will end up being 10% of the total amount actually obligated for construction, regardless of actual costs. The 10% will not vary.

b. 3-7% of the D.O.s for engineering/design. The percentage is established on the front end and does not change. This will be based on actual charges, never a flat rate.

c. 1.5% user fee.

10. Any time construction work is being done (except routine operation maintenance) a construction project manager will always be on site (Steve Rasmussen's staff).

11. The COE technical manager reviews/approves all charges to the site account number every two weeks. This can be shared with/reviewed by the OSC. The COE says there are significant consequences for inappropriate charges to accounts. Sounds like the COE has very strict cost tracking/review requirements.

12. When COE Rapid Response contract is used, the COE will make an initial site visit when the money is in place with the COE and will mobilize and execute clean-up within 30-60 days of receipt of initial funding.

13. When an OSC wants to use the COE in response to an oil spill:

a. The OSC contacts Rick WIlson 402 221-7720 (alternate John Kirschbaum - 402 221 7714). The OSC must first request the COE support.

b. Rick or John will assemble the "PEP Board" (referenced above) to determine whether or not the COE can accept. The OSC will be notified by Rick or John.

c. Upon acceptance the OSC will prepare and fax to Rick the fully completed PRFA. The OSC/support staff should also ensure that the Coast Guard District Office faxes the teletyped message which confirms the FPN# and ceiling amount to the COE office.

d. Only after the documents in c above are received by the COE office will the appropriate budget be established by the COE, delivery orders issued and COE travel arrangements to the site solidified. The COE indicates that this process can take 1-3 days.

14. If an OSC is requesting COE support under the CERCLA umbrella IAG, the OSC (or Vicki Ferguson) must

issue/fax to the COE a completed work authorization form.

15. We talked about a joint OSC COE/Project Manger meeting during the winter. The COE is supportive of this idea. They would like to plan for December/Jan. This would include the 11 construction project managers, all OSCs and the Rapid Response staff.

16. Additionally, at the onset of the meeting we provided an overview and had a discussion of the removal program, statutory requirements and OSC responsibilities and the OSC decision making role.

If something addressed above is unclear, you have questions, or would like to further discuss COE support to removals, let me know.

Currently and in the future the COE is a resource for OSCs. We simply need to make sure that we don't solicit their support at sites for which they do not have the necessary response capability, particularly emergencies.

You will find in your mailbox, in the near future a package of info. regarding the COE.

RICHARDS LABORATORIES INC
55 East Center • Pleasant Grove, Utah 84062 • (801) 785-2500 • Salt Lake: (801) 355-5579 • Watts: (800) 453-1210 • Fax: (801) 785-2521

Date: 1-3-95

Please deliver this message to:

Name: Hayes Griswold

Company: USEPA

Telephone Number: _____

Fax Number: _____

From:

Name: Dean Richards

Richards Corporation
55 East Center
Pleasant Grove, UT 84062

Fax Number: (801)785-2521 **Telephone Number: (801)785-2500**

We are transmitting 2 **pages, including this cover sheet. If the transmission is not complete, please call: (801) 785-2500**

U.S. ARMY
CORPS OF ENGINEERS
FORT CROOK AREA

US Army Corps
of Engineers
Omaha District

293-2500
Phone: (402) [redacted]
Fax: (402) 291-8177

FORT CROOK AREA OFFICE
P.O. BOX 13287 BLDG 627
OFFUTT AFB, NEBRASKA 68113

Please deliver the following pages to: 293-2500

NAME	PHONE FAX ( ) 303
HAYS GREGWOLD	293-1230
COMPANY/OFFICE	
USEPA REGION VII	

FROM	
Greg Wagner	USACE-OSR
DATE	# PAGES INCL COVER
1/5/95	2

HAYS -

IF THIS INFO CONCERNING THE FATE OF BACTERIA AT NAPLES IS NOT SUFFICIENT - PLEASE CALL FOR MYSELF OR LARRY LEAHY 402-293-2500

GREG

VOC Permeation of Plastic Pipe

SAMPLING PROTOCOL

If the map (see instructions on reverse side) shows that the drinking water distribution pipe is immersed in the plume, then VOCs may be contaminating the drinking water and testing should be done.

SAMPLING GUIDELINES:

1) To test for VOCs in drinking water use EPA methods: 502.2, 524.1 or 524.2. Use a laboratory certified for performing the method. The state health laboratory will have a list of certified laboratories to choose from. Obtain bottles from the certified laboratory and instructions on proper labeling, QA/QC procedures, and shipping procedures for the samples.

2) The public water system (PWS) operator and manager will be essential resources to the owner of the leaking underground storage tank for:

   a) determining the layout of the distribution system;
   b) determining the type of pipe and gasket material used;
   c) locating and opening/closing valves;
   d) helping with the VOC sampling;
   e) other water quality data.

3) The pipe materials most vulnerable to permeation when immersed in VOCs in descending order are: PB, PE, PVC/CPVC, metal/concrete/AC with gaskets. Choose sample sites that are expected to yield the highest levels of VOCs in the drinking water.

4) Let the water sit undisturbed for at least eight hours, preferably 24 hours. It will be necessary to valve off a main distribution line to ensure that the water remains undisturbed if testing a main line.

5) To accurately determine the degree of VOC permeation that has occurred, the water contained in the pipe immersed in the VOC plume must be sampled: to accomplish this, the volume of water between the pipe immersed in the plume and the tap must be calculated and purged. This will ensure that the water sample (at the tap) is drawn from pipe section immersed in the plume.

FOR POSITIVE VOC SAMPLES:

If the sample yields positive results, contact the PWS manager and the State Health Department for the next steps. If soil contamination will not be remediated for a long period of time, the distribution pipe may need to be replaced with welded metal which will protect against permeation. Any contaminated pipes and gaskets will have to be replaced. Depending on the level of contamination, it might be necessary to provide bottled water to residents for drinking and cooking. Residents should be informed that they may also be subject to VOCs through volatilization into the air during showering, washing dishes and clothes, and other domestic uses of water.

EPA Region VIII Public Water Supply Section contacts: Dr. Robert Benson & Robert Clement
EPA Region VIII Underground Storage Tank Section contact: Sandy Stavnes
In CO, MT, SD, ND, UT, WY call 1-800-227-8917, otherwise call the Safe Drinking Water Act Hotline at 1-800-426-4791.

2/94

VOC Permeation of Plastic Pipe

SAMPLING PROTOCOL

The following guidelines are given to create a map that shows that water distribution pipes are immersed in the contamination plume:

Create a map of the distribution system that shows the location of drinking water mains and service lines near the LUST site. Label the map with the type of material (PVC, PB, PE, ductile iron/concrete/AC with rubber gaskets) used. Indicate the depth of the mains and service lines on the map. Indicate the depth of the VOC plume and the direction of the flow of contamination in the soil and ground water. Determine the depth of the water table and its seasonal fluctuation. Although a 2-dimensional map is created, it is a 3-dimensional problem. That is, the map may show that the plume is located directly over distribution system piping yet contamination may not be detected because the plume is either above or below the distribution lines. Precautions should be taken to ensure that water table fluctuations throughout the year do not intermittently immerse the drinking water distribution pipes in the contaminant plume.

VOC Permeation of Plastic Pipe

FACT SHEET

HOW DOES IT OCCUR?

There are three ways that volatile organic compounds (VOCs) can pass through plastic pipe and contaminate drinking water supplies:

1) Leakage-VOCs pass through mechanical defects in pipe walls and joints;
2) Leaching-VOCs released from pipe material itself;
3) Permeation-VOCs pass through pipe from outside source.

VOCs from common sources can contaminate drinking water supplies through *PERMEATION* of plastic pipes and gaskets.

WHAT ARE COMMON SOURCES OF VOCs?

- Petroleum hydrocarbons: underground storage tanks, refineries, bulk plants
- Solvents: auto body shops, dry cleaners, manufacturers
- Pesticide and fertilizer application

There are approximately 1.3 million active USTs in the United States of which an estimated 25% are leaking.

WHAT MATERIALS ARE VULNERABLE?

The following materials are listed in order of decreasing vulnerability to permeation.

PIPING and GASKETS	*MINIMUM PERMEATION TIME*
gaskets	8 hours (gasoline in soil)
polybutylene (PB)	24 hours (gasoline in soil)
polyethylene (PE)	24 hours (gasoline vapors)
chlorinated polyvinyl chloride (CPVC)	24 hours (trichloroethylene in soil)
polyvinyl chloride (PVC)	26 days (toluene vapors)

WHAT CAN YOU DO?

During review of site assessments:

1) check the Public Water Supply distribution system to see if piping is immersed in the contaminant plume;

2) if potential for VOC permeation exists based on plume location, pipe material and contaminants, follow EPA Region VIII Sampling Protocol for VOC permeation of plastic pipe and gaskets.

Once pipes and gaskets are contaminated with VOCs, they can NEVER be cleaned enough to be reused and therefore MUST BE REPLACED.

EPA Region VIII Public Water Supply Section contacts: Dr. Robert Benson & Robert Clement
EPA Region VIII Underground Storage Tank Section contact: Sandy Starnes
In CO, MT, SD, ND, UT, WY call 1-800-227-8917, otherwise call the Safe Drinking Water Act Hotline at 1-800-426-4791.

2/94

VOC Permeation of Plastic Pipe

TECHNICAL REFERENCES

The standard for many volatile organic compounds (VOCs) in drinking water is five parts per billion. Some of the highest levels of VOCs found in drinking water have been caused by VOCs permeating plastic pipe. The following research provides documentation and discussion on the theory of permeation.

PIPING

POLYETHYLENE (PE) & POLYBUTYLENE (PB)

In the studies performed with PB and PE pipe, PB pipe was more susceptible to permeation by VOCs than PE pipe. Research by Lee and Kelleher (1984, American Water Works Service Co., Marlton, N.J.) showed that PB pipe was permeated by trichloroethylene (TCE) and gasoline within one day in both soil and vapor environments. PE pipe was permeated by TCE within one week in both soil and vapor environments and was permeated by gasoline within one day in the vapor and three weeks in the soil environment.

Vonk (1985, KIWA, Neuwegein, Netherlands) showed that PE pipe placed in soil saturated with 1100 mg/l of TCE was 21% of the external TCE concentration after 60 days and the PB pipe was 123% of the external TCE concentration after 10 days.

POLYVINYL CHLORIDE (PVC)

Permeation of VOCs through PVC pipe occurs by two types of diffusion: 1) Fickian diffusion-follows Ficks laws of diffusion, 2) Case II diffusion. Case II diffusion is characterized by a considerable swelling and softening of the plastic followed by a rapid and massive breakthrough of organics into the water inside the pipe. Typically, VOCs will not pass through the plastic until the entire pipe wall has swelled. Softening of PVC mains has resulted in pipe failure.

Beren (1985, Journal, American Water Works [AWWA]) demonstrated that the ability of VOCs to plasticize (soften) PVC pipe decreases as the number of chlorine substitutions made on the same carbon atom increases. For example, dichloromethane (CH_2Cl_2) softens PVC pipe more readily than trichloromethane ($CHCl_3$), which in turn softens the plastic more easily than tetrachloromethane (CCl_4). This is consistent with the findings of Salame and Pinsky (1964, Modern Packaging), who showed that 1,1,2 trichloroethane softens PVC pipe much sooner than 1,1,1 trichloroethane. Vonk (1985) showed that various additives used in PVC pipe did not significantly alter the softening capabilities and, therefore, the permeation capabilities of VOCs.

Lee and Kelleher (1984) showed that chlorinated PVC (CPVC) was permeated by TCE within 1 day in the soil environment but not for 14 weeks in the vapor environment. Gasoline permeation of CPVC occurred within 6 weeks in the soil environment and not at all in the vapor environment. Cassidy, et al. (1983, Battelle, Columbus Laboratory, Ohio) showed that permeation by toluene occurred within 41 days, and appeared to represent Case II type diffusion. Vonk (1985) demonstrated similar results with PVC where permeation by toluene occurred within 26 days. On the other hand, some researchers discovered that no permeation occurs in PVC pipes.

VOC Permeation of Plastic Pipe

Vonk (1985) showed that permeation through PVC pipe depends upon the activity, which is defined as the percent that the soil is saturated with the organic compound. He concluded that significant permeation will take place through PVC pipes with: 1) alkylated aromatic hydrocarbons if the activity of the organic compound is greater than 0.25; and 2) anilines, chlorinated hydrocarbons, ketones and nitrobenzenes, if the activity of the organic compound is greater than 0.1.

For example, gasoline at 0.25 activity (25% of maximum soil saturation contamination) corresponds to approximately 125 parts per million in the ground water. PVC is a good barrier up to this level of soil saturation. However, research shows that VOCs can permeate PVC pipe within one month when the activity exceeds 0.25.

GASKETS

Cassidy et al. (1983) exposed pipe joints of ductile iron, PVC, and asbestos cement (AC) to organic chemicals for 6 weeks. Almost all of the pipe joints failed within the 6-week test. He concluded that gasket material was more susceptible to VOC permeation than the pipe material.

Vonk (1985), showed that 4 meter lengths of impervious pipe joined with impervious coupling and elastic rubber gaskets concentrated the VOCs inside the pipe to about 1% of the external VOC concentration within 2 days.

Glaza and Park (1992, J. AWWA) showed that nitrile gaskets were more resistant than styrene butadiene rubber (SBR) gaskets to permeation by compounds that are found in gasoline. After eight hours of exposure to gasoline, permeation of benzene through SBR gaskets exceeded 550 ppb whereas permeation through nitrile gaskets resulted in benzene concentrations of only 40 ppb.

SELECTED REFERENCES

Jenkins, D., Park, J.K., Holsen, T.M., Bontoux, L., and Selleck, R.E. (1989). *Permeation of Plastic Pipes by Organic Chemicals*. Department of Civil Engineering, University of California, Berkeley, CA. January 1989.

Lee, R. G. and Kelleher, D. L. (1984). *Investigation of Plastic Pipe Permeation by Organic Chemicals*. Amer. Water Works Service Co. Inc. Marlton, NJ.

Vonk, M. W. (1985). *Permeation of Organic Compounds through Pipe Materials*. Publication No. 85, KIWA. Neuwegein, The Netherlands.

Federal Agency
Pollution Removal Funding Authorization

Recipient Agency: _____
Address: _____
_____

1. Purpose

This document authorizes reimbursement to the Recipient Agency from the Oil Spill Liability Trust Fund or CERCLA funds for certain removal costs incurred in response to the following pollution incident, _____, FPN/CERCLA ID #_____. This funding authorization is expressly contingent on the Recipient's compliance with all requirements contained herein.

2. Approved Functions and Reimbursement Limit

Costs will be reimbursed only for actions that are directed or approved in advance by the FOSC. Approval may be verbal or written. Assessment, restoration, rehabilitation or replacement of natural resources damaged by the spill are not covered.

Maximum limit of authorization: $_____.

3. Conditions

See attached page(s) for special conditions, dates of performance, directions or approvals.

4. Period of Authorization

This authorization shall remain in effect until the FOSC determines that the clean-up has been completed or other date specified by the FOSC.

5. Reimbursement Procedure

The Recipient Agency will submit an SF-1080 with detailed records of expenditures and activities for which reimbursement is sought to the FOSC upon completion of removal activities. The agency may elect to use its own records providing an equivalent amount of documentation which has NPFC approval, or the agency may elect to use NPFC's Resource Cost Documentation package. Standard methods and forms for record keeping may be provided by the FOSC.

This agreement will be closed one year from the date of authorization. Any amount for which reimbursement and documentation have not been submitted will be deobligated, after written notice to the Agency involved and a 90 day period has elapsed.

ORIGINAL

Federal Agency
Pollution Removal Funding Authorization (cont'd)

6. **Accounting Data**

Document Control Number: _____

7. **Points of Contact**

A. _____ Tel ( )_____
FOSC

B. _____ Tel ( )_____
Recipient Agency Representative

C. _____ Tel ( )_____
NPFC Case Officer

8. **Authorizing Official**

Signature: _____

Title: _____ Date: _____

Attachments: No _____ Yes _____

FAX TRANSMISSION HEADER

EPA COMMAND POST
GLENROCK: OIL SEEP
GLENROCK, WYOMING

PA U.S. Environmental Protection Agency
Region VIII

US Army Corps of Engineers
Omaha District

TO: Hays Griswold

FROM: Mike Sullivan

MESSAGE: DRAFT NAPLES RPT

Naples Need some Fixing

INTERNATIONAL TECHNOLOGY CORPORATION

RIEDEL ENVIRONMENTAL SERVICES INC.

ecology and environment, inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

Under Technical Direction Document (TDD) #T08-9402-017 the U. S. Environmental Protection Agency Emergency Response Branch (EPA) tasked the Ecology & Environment, Inc., Technical Assistance Team (TAT) to conduct a site assessment at the Naples site in Vernal, Utah. Specifically, TAT was tasked to: 1) Document and confirm the source of contamination, 2) delineate the free product and contaminant plume, 3) characterize the aquifer, 4) sample as determined by the OSC, 4) obtain information on the aquifer necessary to design and construct a free product and ground water recovery system, 5) provide and interim report suggesting options for remediation, 6) provide a formal report, and 7) provide QA-II data.

The U.S. Army Corps of Engineers (ACE) was also on site. Through the ACE contractor a pump test was conducted and the hydraulic characteristics of the aquifer were determined. Also, the ACE contractor provided options for remediating the contamination. Due to the above actions the OSC determined that TAT would not be required to perform items 3, 4, and 5 for the site. Also, due to the impending pump test which would alter the product thickness in the investigation area no determination of product thickness across the plume was attempted by the TAT.

2.0 BACKGROUND

The site is located in Naples, Utah, a suburb of Vernal, Utah (Figure 1). The Questar Pipeline communications and warehouse center had a gasoline product alarm trip in a monitoring well adjacent to the underground storage tank (UST) on the site. Questar Pipeline corporations consultants performed preliminary site work on the questar property. Testing by Questar of the UST on the property confirmed the integrity of the lines and the tank. Further investigation, by Questar, through the use of soil gas and monitoring wells, indicated that the contamination was coming from an off-site source. The State of Utah representatives had sampled product storage facilities in the area and analytical data indicated the source was the Naples Truck Stop located north and west of the Questar property. Integrity testing of the product lines from the above ground storage tanks (AST) at the Naples Truck Stop indicated a leak in one of the lines. After the results of the leak test, the product in the AST was transferred to another tank. It is undetermined when the leak first began or how much product has leaked into the aquifer. Preliminary hydrologic information indicated that ground water flow was to the south east at approximately 2 to 6 feet per month. In March ground water was approximately 6 to 7 feet below the surface with an expected rise in elevation to within 3 foot of the surface during the spring.

The EPA responded to the site to investigate the source of the product and to determine options to clean-up the spill. TAT accompanied the OSC on the initial site visit. Meetings were held on site with personnel from Questar, Questar's consultants, the Unitah County Public Health representative, the EPA OSC, and TAT. Questar reviewed the site history and activities to date including the soil gas survey and the installation of monitoring wells on the Questar property. Questar is

Location	
180N, 450E	2
180N, 420E	2
180N, 450E	2
180N, 420E	2
180N, 390E	2
180N, 360E	2
180N, 330E	2
180N, 300E	2
180N, 480E	2
180N, 510E	2
180N, 540E	2
300N, 540E	2
390N, 540E	2
420N, 540E	2
150N, 540E	
210N, 480E	

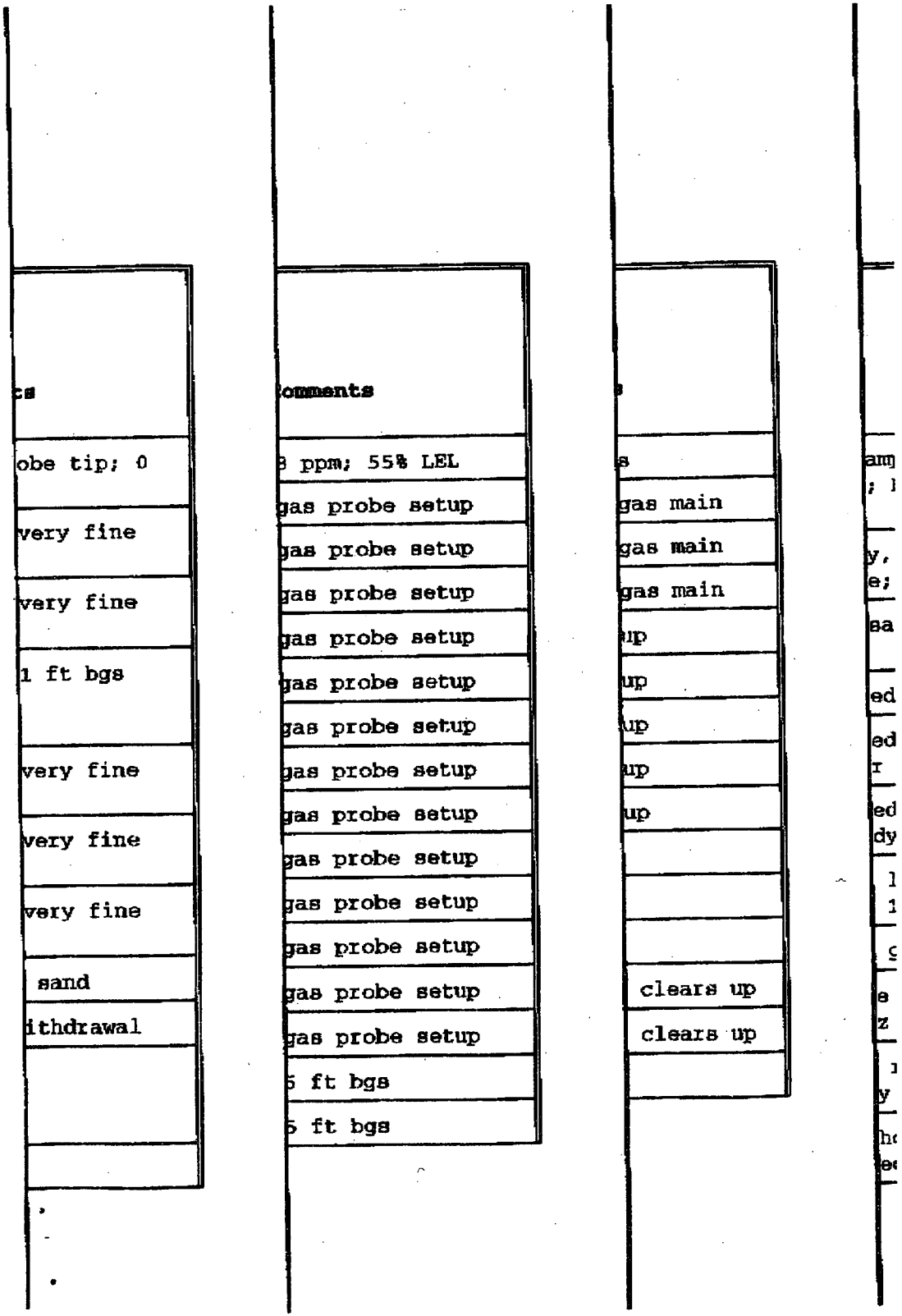
[TABLES]9402-01

TABLE 1
GEOPROBE LOG
NAPLES GAS SITE
TDD #T08-9402-017

Location	Date	Time	Soil Gas HNu (ppm)		Approx. Depth to Water (ft)	H_2O Sample	Headspace (ppm)	Comments
			Peak	Constant				
180N, 450E	2/28/94	1148	110	60				6 ft bgs
180N, 420E	2/28/94	1203	50	30				6 ft bgs
180N, 450E	2/28/94	1148	110	60				5.5 ft bgs
180N, 420E	2/28/94	1203	50	30				5.5 ft bgs
180N, 390E	2/28/94	1216	110	75				5.5 ft bgs
180N, 360E	2/28/94	1229	3.5	3.5				5.5 ft bgs
180N, 330E	2/28/94	1248	100	90				5.5 ft bgs
180N, 300E	2/28/94	1311	120	50				5.5 ft bgs
180N, 480E	2/28/94	1405	110	8				5.5 ft bgs
180N, 510E	2/28/94	1425	135	50-100				In ditch, 7 ft from gas line
180N, 540E	2/28/94	1440	80	60				In road, 6.5 ft bgs
300N, 540E	2/28/94	1500	120	60				In road, 6.5 ft bgs
390N, 540E	2/28/94	1540	18	6				In road, 6.5 ft bgs
420N, 540E	2/28/94							Refusal at 6 ft
150N, 540E	3/1/94	1520	80	80				In road, 6.5 ft bgs
210N, 480E	3/1/94	0750	---	8				20% on LEL on explosimter; HNu 0.2 background

[TABLES]9402-017.MS

Extended Page



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FAX TRANSMISSION HEADER

EPA COMMAND POST
GLENROCK OIL SEEP
GLENROCK, WYOMING

EPA U.S. Environmental Protection Agency
Region VIII

US Army Corps of Engineers
Omaha District

TO: Hays Griswold

FROM: Mike Sullivan

MESSAGE: DRAFT NAPLES RPT

TABLES Need Some Fixing

INTERNATIONAL TECHNOLOGY CORPORATION

RIEDEL ENVIRONMENTAL SERVICES INC.

ecology and environment, inc.

TABLE 1 (continued)
GEOPROBE LOG
NAPLES GAS SITE
TDD #T08-9402-017

Location	Date	Time	Soil Gas HNu (ppm)		Approx. Depth to Water (ft)	H_2O Sample	Headspace (ppm)	Comments
			Peak	Constant				
420N, 330 E	3/3/94	1430	50	50		No		
420N, 390E	3/3/94	1515	.5	.5	9.0	Yes	0.0	Refusal @ 10.5 ft; purged 4 oz began to clear
480N, 330E	3/3/94	1540	0	0	9.0	Yes	1.0	Silty water; 30 oz purged; along fenceline
480N, 270E	3/3/94	1630	60	60	---	No	---	
540N, 270E	3/3/94	1640	60	60	8.0	Yes	25	Diesel smell in water; near product storage with stained soils
480N, 270E	3/3/94	1725	---	---	8.0	Yes	---	Diesel smell in water; brown, silty/sandy purge
420N, 270E	3/3/94	1800	70	15.5		Yes	25	Very sandy; plugged/cave
510E, 90N (triple volume)	3/4/94	0835			9.0	Yes	100	Refused at 8 ft; purged to 40 oz; light brown water; began to clear
720E, 720N	3/4/94	0835	---	---	---	Yes	---	Rinsate blank
540E, 390N	3/4/94	1010			10-11 ft	Yes	0.0	Hard going at 7 ft; purged 40 oz; cleared up; light brown water

TABLE 1 (continued)
GEOPROBE LOG
NAPLES GAS SITE
TDD #T08-9402-017

Location	Date	Time	Soil Gas HNu (ppm)		Approx. Depth to Water (ft)	H_2O Sample	Headspace (ppm)	Comments
			Peak	Constant				
15E, 615N	3/4/94	1140	0	0	10-11	Yes	0.0	Hard going at 10 ft; silty, light brown purge water; began to clear at 40 oz; pumped dry
540E, 15N	3/4/94		0	0	---	Yes	---	Hard going at 8 ft; refusal at 10-11 ft; not enough water in hole for VOA sample
565N, 60E	3/22/94	1300	---	18				Soil gas
565N, 15E	3/22/94	1315	---	3				Soil gas
565N, 32W	3/22/94	1330	---	0				Soil gas
535N, 60E	3/22/94	1345	---	10				Soil gas
535N, 30E	3/22/94	1400	---	80				Soil gas
540N, 15W	3/22/94	1415	---	25				Soil gas
540N, 10E	3/22/94	1430	---	10				Soil gas
535N, 50E	3/22/94	1445	---	12				Soil gas
510N, 45E	3/22/94	1500	---	75				Soil gas
510N, 70E	3/22/94	1515	---	30				Soil gas
510N, 25E	3/22/94	1530	---	25				Soil gas

TABLE 1 (continued)
GEOPROBE LOG
NAPLES GAS SITE
TDD #T08-9402-017

Location	Date	Time	Soil Gas HNu (ppm)		Approx. Depth to Water (ft)	H_2O Sample	Headspace (ppm)	Comments
			Peak	Constant				
510N, 5W	3/22/94	1545	---	11				Soil gas
430N, 10W	3/22/94	1600	---	5				Soil gas
430N, 40W	3/22/94	1615	---	2				Soil gas
370N, 10E	3/22/94	1630	---	30				Soil gas
370N, 20W	3/22/94	1645	---	3				Soil gas

TABLE 2
SAMPLING SUMMARY FOR LABORATORY ANALYSIS
NAPLES GAS SITE
TDD #9402-017

Sample ID	Date	Time	Sample Tag No.	Chain-of-Custody	Analysis
90E, 270N	3/2/94	1500	8-94458	8-11898	TVPH
MWC-2	3/2/94	1135	8-94459	8-11898	TVPH
210E, 180N	3/3/94	1130	8-94460	8-11898	TVPH
240E, 60N	3/2/94	0915	8-94461	8-11898	TVPH
390E, 420N	3/3/94	1515	8-94462	8-11898	TVPH
510E, 90N (triple volume)	3/4/94	0835	8-94463	8-11898	TVPH
540E, 330N	3/2/94	1015	8-94464	8-11898	TVPH
630E, 90N	3/2/94	0930	8-94465	8-11898	TVPH
630E, 240N	3/2/94	1205	8-94466	8-11898	TVPH
270E, 540N	3/3/94	1640	8-94467	8-11898	TVPH
270E, 480N	3/3/94	1725	8-94468	8-11898	TVPH
270E, 420N	3/3/94	1800	8-94469	8-11898	TVPH
360E, 60N	3/3/94	0840	8-94470	8-11898	TVPH
630E, 330N	3/3/94	1000	8-94471	8-11898	TVPH
MW-1	3/4/94	0850	8-94472	8-11898	TVPH
MWT-4	3/2/94	1200	8-99473	8-11899	TVPH
TB-1	3/4/94	0735	8-99474	8-11899	TVPH
RN-1	3/4/94	0835	8-99487	8-11899	TVPH
270E, 540N	3/3/94	1640	8-94475	8-11899	G.C. Fingerprint
270E, 480N	3/3/94	1725	8-94476	8-11899	G.C. Fingerprint
270E, 410N	3/3/94	1800	8-94477	8-11899	G.C. Fingerprint
360E, 60N	3/3/94	0840	8-94478	8-11899	G.C. Fingerprint
630E, 330N	3/3/94	1000	8-94479	8-11899	G.C. Fingerprint
MW-1	3/4/94	0850	8-94480	8-11899	G.C. Fingerprint
MWT-4	3/4/94	0900	8-94481	8-11899	G.C. Fingerprint
Chevron	3/3/94	1530	8-94482	8-11900	G.C. Fingerprint
Texaco	3/3/94	1520	8-94483	8-11900	G.C. Fingerprint

MW-8	3/3/94	1522	8-94484	8-11900	G.C. Fingerprint
Sinclair/Quastar	3/3/94	1534	8-94485	8-11900	G.C. Fingerprint
510E, 90N	3/4/94	0835	8-94488	8-11899	G.C. Fingerprint
720E, 720N (field blank)	3/4/94	0835	8-94486	8-11899	TVPH
15E, 615N (background)	3/4/94	1140	8-94489	8-11899	TVPH

TABLE 3
IMMUNOASSAY TEST KIT RESULTS (ppb)
NAPLES GAS SITE
TDD #T08-9402-017

Sample ID	Date	IA Result	Sample ID	Date	IA Result
90N, 630E	3/2/94	165	240N, 630E	3/3/94	<165
330N, 540E	3/2/94	165	MW-C-01	3/3/94	<165
410N, 420 E	3/2/94	165	MW-C-02	3/3/94	<165
240N, 630E	3/2/94	165	MW-C-03	3/3/94	≤165
MW-C-01	3/2/94	165	MW-T-04	3/3/94	165
MW-C-02	3/2/94	≤165	60N, 240E	3/3/94	<165
MW-C-03	3/2/94	<165	60N, 360E	3/3/94	≥165
MW-T-04	3/2/94	165	60N, 480E	3/3/94	<165
330N, 540E (repeat)	3/2/94	165	330N, 630E	3/3/94	<165
330N, 540E (dilution)	3/2/94	<1,650	470N, 390E	3/3/94	<165
MW-C-03 (repeat)	3/2/94	165	180N, 165E	3/3/94	≥165
MW-C-03 (dilution)	3/2/94	1,650	480N, 330E	3/3/94	<165
300N, 30E	3/3/94	<165	180N, 210E	3/3/94	<165
300N, 90E	3/3/94	≤165	480N, 170E	3/4/94	165
270N, 30E	3/3/94	≥165	540N, 270E	3/4/94	165
270N, 90E	3/3/94	<165	420N, 270E	3/4/94	165
MW-C-03 (dilution)	3/3/94	<1,650	540E, 390N	3/4/94	<165

[TABLES]9402-017.MS

90N, 630E	3/3/94	≤165	15E, 615N	3/4/94	≥165
330N, 540E	3/3/94	165	510E, 90N	3/4/94	165
410N, 420E	3/3/94	<165	510E,15S	3/4/94	<165

TABLE 4
PRELIMINARY RESULTS - ORGANIC DATA REVIEW
PETROLEUM PRODUCTS IN LIQUID (mg/kg)
NAPLES GAS SITE
TDD #T08-9402-017

SAMPLE NO.:	**2926.01**	**2927.01**	**2928.01**	**2929.01**
SAMPLE LOCATION:	**CHEVRON**	**TEXACO**	**MW-8**	**SINCLAIR**
EPA TAG #:	**B-94482**	**B-94483**	**B-94484**	**B-94485**
DATE:	**3/3/94**	**3/3/94**	**3/3/94**	**3/3/94**
TIME:	**1530**	**1510**	**1522**	**1534**
COLOR:	**CLEAR**	**AMBER**	**AMBER**	**PINK**
Gasoline	270,000	2,500,000	300,000	480,000

[TABLES]9402-017.MS

TABLE 5
PRELIMINARY DATA RESULTS - BTEX IN WATER (µg/L)
NAPLES GAS SITE
TDD #T08-9402-017

SAMPLE NO.:	94-029290	94-029300	94-029310	94-029320	94-029330	94-029340	94-029350	94-029360
STATION LOCATION:	NG-MW-07	NG-MW-01	NG-MW-03	NG-MW-04	NG-MW-05	NG-MW-06	NG-MW-08	NG-TB-01
SAMPLE TAG NO.:	8-94491	8-94493	8-94494	8-94495	8-94496	8-94497	8-94498	8-94499
DATE:	3/22/94	3/22/94	3/22/94	3/22/94	3/22/94	3/22/94	3/22/94	3/22/94
TIME:	0953	0915	1010	1015	1022	0935	0857	1000
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND

ND = Analyzed for but not detected.

TABLE 4
PRELIMINARY RESULTS - ORGANIC DATA REVIEW
PETROLEUM PRODUCTS IN LIQUID (mg/kg)
NAPLES GAS SITE
TDD #T08-9402-017

SAMPLE NO.:	2926.01	2927.01	2928.01	2929.01
SAMPLE LOCATION:	CHEVRON	TEXACO	MW-8	SINCLAIR
EPA TAG #:	8-94482	8-94483	8-94484	8-94485
DATE:	3/3/94	3/3/94	3/3/94	3/3/94
TIME:	1530	1510	1522	1534
COLOR:	CLEAR	AMBER	AMBER	PINK
Gasoline	270,000	2,500,000	300,000	480,000

TABLE 6
PRELIMINARY RESULTS - ORGANIC DATA REVIEW
TOTAL PETROLEUM HYDROCARBONS/TOTAL HYDROCARBONS IN WATER (g/L)
NAPLES GAS SITE
TDD ET08-9402-017

SAMPLE NO.:	MWT-4	TB-1	270E,540N	270E,480N	270E,420N	360E,60N	630E,330N	MW-1
STATION LOCATION:	MWT-4	TB-1	270E,540N	270E,480N	270E,420N	360E,60N	630E,330N	MW-1
EPA TAG NO.:	8-94473	8-94474	8-94467	8-94468	8-94469	8-94470	8-94479	8-94472
	8-94481		8-94475	8-94476	8-94477	8-94478	8-94471	8-94480
DATE:	3/4/94	3/4/94	3/3/94	3/3/94	3/3/94	3/3/94	3/3/94	3/4/94
TIME:	0920	0735	1640	1725	1800	0840	1000	0850
Total Hydrocarbons:								
Gasoline	680	---	1,000	470	800	ND	ND	110
Kerosene	100U	---	100U	100U	100U	100U	100U	100U
Lube oil	ND	---	ND	ND	ND	ND	ND	ND
Fuel oil	100U	---	100U	100U	100U	100U	100U	100U
Diesel	100U	---	100U	100U	100U	100U	100U	100U
TPH as Gasoline	2,000	ND	4,800	3,400	6,200	ND	ND	ND

SAMPLE NO.:	720N,720E	RN-1	510E,90N	15E,615N	90E,170N	MWC-2	210E,180N
STATION LOCATION:	720N,720E	RN-1	510E,90N	15E,615N	903,170N	MWC-2	210E,180N
EPA TAG NO.:	8-94486	8-94487	8-94488	8-94489	8-94458	8-94459	8-94460
					8-94463		
DATE:	3/4/94	3/4/94	3/4/94	3/4/94	3/2/94	3/2/94	3/3/94
TIME:	0835	0835	0835	1140	1500	1135	1130
Total Hydrocarbons:							
Gasoline	---	---	1,900	---	---	---	---
Kerosene	---	---	100U	---	---	---	---
Lube oil	---	---	ND	---	---	---	---
Fuel oil	---	---	100U	---	---	---	---
Diesel	---	---	100U	---	---	---	---
TPH as Gasoline	ND	ND	7,900	ND	ND	ND	ND

ND = Analyzed for but not detected.

[TABLES]9402-017.MS

TABLE 6 (continued)
PRELIMINARY RESULTS - ORGANIC DATA REVIEW
TOTAL PETROLEUM HYDROCARBONS/TOTAL HYDROCARBONS IN WATER (g/L)
NAPLES GAS SITE
TDD #T08-9402-017

SAMPLE NO.:	240E,60N	390E,420N	540E,330N	630E,90N	630E,240N
STATION LOCATION	240E,60N	390E,420N	540E,330N	630E,90N	630E,240N
EPA TAG NO.:	8-94461	8-94462	8-94464	8-94465	8-94466
DATE:	3/2/94	3/3/94	3/2/94	3/2/94	3/2/94
TIME:	0915	1515	1015	0930	1205
Total Hydrocarbons					
Gasoline	ND	ND	ND	ND	ND
Kerosene	ND	ND	ND	ND	ND
Lube oil	ND	ND	ND	ND	ND
Fuel oil	ND	ND	ND	ND	ND
Diesel	ND	ND	ND	ND	ND
TPH as Gasoline	ND	ND	130	730	ND

ND = Analyzed for but not detected.

TABLE 6 (continued)
PRELIMINARY RESULTS - ORGANIC DATA REVIEW
TOTAL PETROLEUM HYDROCARBONS/TOTAL HYDROCARBONS IN WATER (g/L)
NAPLES GAS SITE
TDD #T08-9402-017

SAMPLE NO.:	240E,60N	390E,420N	540E,330N	630E,90N	630E,240N
STATION LOCATION	240E,60N	390E,420N	540E,330N	630E,90N	630E,240N
EPA TAG NO.:	8-94461	8-94462	8-94464	8-94465	8-94466
DATE:	3/2/94	3/3/94	3/2/94	3/2/94	3/2/94
TIME:	0915	1515	1015	0930	1205
Total Hydrocarbons					
Gasoline	ND	ND	ND	ND	ND
Kerosene	ND	ND	ND	ND	ND
Lube oil	ND	ND	ND	ND	ND
Fuel oil	ND	ND	ND	ND	ND
Diesel	ND	ND	ND	ND	ND
TPH as Gasoline	ND	ND	130	730	ND

ND = Analyzed for but not detected.

GC SCREENING RESULTS
NAPLES TRUCK STOP
T08-9402-017
EUT0183BBA

Sample Number	Date	Time	No. of Peaks	Tentative Compound Identity (ppb)
410N420E	3/2/94	1145	0	none
270N30E	3/2/94	1530	0	none
300N30E	3/2/94	1620	0	none
300N90E	3/2/94	1650	0	none
60N480E	3/2/94	1800	0	none
MWC-03	3/2/94	1145	0	none
MWT04	3/2/94	1200	4	1 Unknown; Toluene 122; Benzene 981; O-Xylene 1154
180N210E	3/3/94	1145	0	none
480N330E	3/3/94	1540	0	none
540E390W	3/4/94	1010	0	none
MW-1	3/4/94	0850	8	4 Unknown; Toluene 43053; Benzene 42144; Xylene 7368; O-Xylene 28017

INTERNATIONAL TECHNOLOGY CORPORATION

Fax Cover Page

Page 1 of 16

Charge No.:

To: Hays Griswold **Date:** 10/13/94

Location: U.S. EPA - Denver **Fax No.:** (303) 291-7168

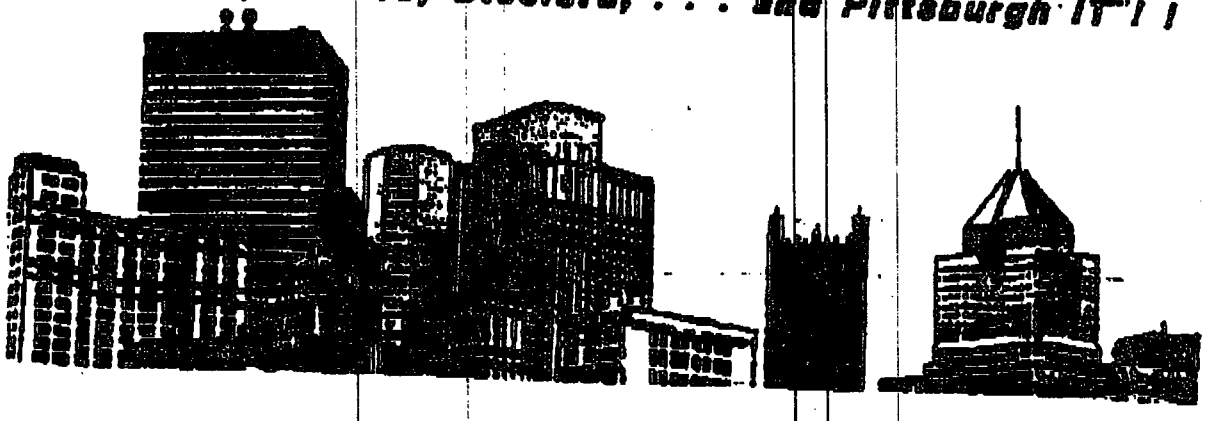
From: Tom Mathison

IT Corporation
2790 Mosside Boulevard
Monroeville, Pennsylvania 15146-2792

Fax No.: (412) 373-7135
Telephone No.: (412) 372-7701

Remarks: Bioremediation Treatment Plan - Please review and let me know if you have any changes.

City of Champions . . .
Penguins, Pirates, Steelers, . . . and Pittsburgh IT ! !



BIOREMEDIATION TREATMENT PLAN
NAPLES TRUCK STOP
NAPLES, UTAH

CONTRACT NO. DACW45-90-D-9002
DELIVERY ORDER NO. 88
IT PROJECT NO. 519063

PREPARED BY:

IT CORPORATION
2790 MOSSIDE BOULEVARD
MONROEVILLE, PA 15146
AND
RICHARDS CORPORATION
55 EAST CENTER
PLEASANT GROVE, UTAH 84062

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102

Table of Contents

1.0 Introduction

IT Corporation (IT) was requested by the U.S. Army Corps of Engineers (USACE) to provide support for an Immediate Response Action at the Naples Truck Stop in Vernal, Utah under Contract No. DACW45-90-D-9002 and Delivery Order No. 88. The scope of this project consists of the recovery and treatment of groundwater impacted from a release of unleaded gasoline which has leaked from an underground pipeline located on Naples Truck Stop property. Prior to IT's involvement in the project, Questar Pipeline, whose property was directly affected by the release, had contracted with Richard's Laboratories of Salt Lake City, Utah to assist in the treatment of extracted groundwater through a bioremediation system. IT was requested to utilize Richard's Laboratory and their technology in the final remediation plan.

This bioremediation plan details the biological treatment system which was utilized during the interim recovery system, the evaluation of the effectiveness of the treatment system and the final design which is being incorporated into the final remediation plan.

2.0 Bioremediation Technology

The two major approaches to bioremediation of hazardous hydrocarbon spills and other environmental pollutants are microbial inoculation (seeding) and the bioaugmentation of naturally occurring microbial activities. In most cases bioaugmentation consists of environmental modification to eliminate some limiting factor that is restricting the rates of microbial growth and metabolism of a polluting substance. For this approach to work the pollutant must not be recalcitrant--that is, microorganisms must have the genetic and physiological capability to degrade the substance. The most common factors controlled to stimulate biodegradative activities by bioaugmentation are nutrient concentrations--usually nitrogen and phosphorus concentrations, molecular oxygen concentration, redox potential, and moisture levels. Additionally, cosubstrates can be provided as growth-supporting substances.

The use of bioaugmentation for bioremediation of hydrocarbons is an outgrowth of basic studies on microbial metabolism and ecology. Studies beginning in the 1950s focused on elucidating pathways of microbial metabolism of hydrocarbons with the aim of developing single-cell protein bioreactors using petroleum-based substrates. During this period the basic

understanding of metabolism of hydrocarbons was developed. These studies expanded to examine the metabolism of chlorinated hydrocarbons, many of which are used as pesticides or otherwise wind up as persistent and/or toxic environmental contaminants. These basic physiological studies on microbial metabolism were supplemented beginning in the late 1960s with an examination of the ecological factors controlling the distributions and activities of microorganisms in the environment. Some of these studies aimed at discovering the factors controlling the rates of microbial degradation of pollutants in the environment. During this period is was recognized that microorganisms had limitations and sometimes fail to degrade wastes and pollutants at rates fast enough to preclude adverse environmental impacts.

While bioaugmentation could do little to overcome the limitations of microbial evolution to develop enzymatic degradation pathways, it could overcome limitations imposed by environmental restrictions on microbial degradation. Conditions could be optimized in bioreactors, as they had been for decades in industrial fermentors and sewage and other waste treatment facilities, to achieve microbial degradation of wastes and pollutants. In situ treatment could also be designed to overcome factors limiting microbial degradative activities in nature.

Oxygen Supplementation

The growth potentials of microorganisms and their specific metabolic activities depend upon the availability of molecular oxygen and the redox potential. Some processes occur only under aerobic conditions, whereas others are strictly anaerobic. The initial steps in the biodegradation of hydrocarbons by most bacteria and fungi, for example, involve the oxidation of the substrate by oxygenases, for which molecular oxygen is required. Hydrocarbons are abundant pollutants, occurring in environments contaminated by wood treatment products (creosote contains high concentrations of polynuclear aromatic hydrocarbons), oil spills (petroleum contains a vast diversity of aliphatic, alicyclic, and aromatic hydrocarbons), and leakages from underground storage tanks (benzene, ethylbenzene, toluene, and xylenes--BETX--are principal contaminants from hundreds of thousands of leaking tanks).

While oxygen usually is not rate limiting in the upper levels of water in marine and freshwater environments, the availability of oxygen in soils, sediments, and aquifers is often limiting and dependent on the type of soil and whether the soil is waterlogged. When

pollutants reach the water table and have contaminated aquifers, oxygen availability is the major problem in bioremediation. Oxygen solubility in water is low (at saturation, around 9 mg/L), and the oxygen demand for hydrocarbons in some groundwater and soil environments is severely limited by oxygen availability. The oxidation of 1 L of hydrocarbon will exhaust the dissolved oxygen (8 mg/L) in 385,000 to 400,000 L of water.

It is possible to overcome oxygen limitations by supplying oxygen to microorganisms in situ or by placing contaminated materials in an aerobic bioreactor where oxygen is supplied.

Nutrients and Fertilization

Nitrogen, phosphorus, and other mineral nutrients are necessary for incorporation into biomass. Concentrations of available nitrogen and phosphorus often limit rates of microbial degradative activities.

Aquifer Nutriation

When a polluted aquifer is pumped in order to keep the pollution from spreading, the recovered water is supplemented with mineral nutrients (nitrogen and phosphorus) and aerated. The combination of biodegradation and aeration frees the recovered water from the dissolved pollutants. This water, containing now substantial numbers of hydrocarbon-degrading microorganisms, is reinjected into the aquifer around the perimeter of the polluted plume. This "pump-and-treat" cleanup operation is then aided by the in situ activity of the injected microorganisms. To maximize in situ activity, the water may be supplemented prior to injection with additional mineral nutrients and materials serving as electron sinks for hydrocarbon oxidation.

3.0 Biological Treatment System

3.1 Design and Operation

Figure 1 shows the layout of the interim bio treatment system as set up for it's evaluation. The groundwater effluent from the recovery system was pumped into the 12,000 gallon bioprocess tank. This tank contained about 25 percent volume of a synthetic mat material inoculated with bacteria. During initial operation of the bio treatment system, the recovery

system air effluent was not pumped through it. However, to fully evaluate the system's ability to break down all of the hydrocarbon contamination, the air effluent from the recovery system was pumped into this 12,000 gallon tank about 3 feet blow the surface. Fresh air was blown into the 12,000 gallon tank to supply oxygen for the organisms.

The water effluent from the 12,000 gallon tank was pumped through bio poly tanks 1 and 2. Bio poly tank 1 was filled with the synthetic mat matrix for bacterial growth. Bio poly tank 2 contained activated charcoal as the medium for bacteria to grow on. Fresh air was also blown into the two bio poly tanks to supply oxygen for the organisms.

Initial water quality testing prior to inputting the contaminated air effluent from the recovery system to the treatment system indicated that the bio system was substantially breaking down the contaminant level in the water. However, because of the clean air being blown through all bio tanks for oxygenation, the amount of hydrocarbon loss to the atmosphere was in question. To guarantee that the minimum contaminant levels for discharge to the POTW were met, an air stripper was used as a final treatment step in the overall process. This was throughout the testing and evaluation of the bio treatment system.

3.2 System Evaluation and Mass Balance

In order to assess the actual contaminant reduction attributed to the bio treatment system itself, a contaminant mass balance was performed. This mass balance included all contaminant mass flows into and out of the treatment system.

Influent and effluent air and water samples were collected along with a midpoint water sample (just downgradient of the 12,000 gallon tank). This totals to 3 air and 3 water samples per sampling event. Due to problems with the recovery system vacuum pump only one round of samples were collected.

Both air and water samples were analyzed for BTEX. The final water output sample was also analyzed for TPH gasoline. The POTW discharge permit allowances are based upon TPH measurements. Figure 2 shows the bio process flow along with the mass balance results. The mass balance data is included in Appendix A.

Results of this mass balance were as follows:

Input to Treatment System (First bio process tank)

Total loading from water:	2.26 lb/day total BTEX
Total loading from air:	7.00 lb/day total BTEX

Discharge from First Tank

To air:	2.21 lb/day total BTEX
To water effluent:	0.034 lb/day total BTEX
Biological breakdown:	7.11 lb/day total BTEX

Input to Second Tank Series (two poly tanks)

Water input:	0.034 lb/day total BTEX

Discharge from Second Tank Series

To air:	0.0084 lb/day total BTEX
To water effluent:	0.0000987 lb/day total BTEX
Biological breakdown:	0.0255 lb/day total BTEX

Overall water and air flow during the test was over 50 percent less than expected because of unexpected wear on the vacuum pump. This reduced the contaminant loading from water by approximately 50 percent. However, when the air flow was higher, the contaminant concentration in the air was about 50 percent less. Therefore, the overall loading from air probably was not decreased because of the reduced air flow.

The biological treatment system achieved about a 77 percent breakdown of the total BTEX contamination in the flow stream. This level of breakdown could have been increased had the air effluent from the first bio process tank (12,000 gallon black tank) been input to the two poly tanks.

Based on these results and the proposed design of the final bio treatment system, it should be effective enough in reducing contaminant levels for discharge to the POTW and air without the aid of any additional treatment of the water or air flow streams. This is assuming that the bio treatment system maximizes the surface area in all treatment tanks for organism growth.

4.0 Final Biological Treatment System

4.1 System Design

Figure 3 shows the proposed layout for the final biological treatment system. The major differences in this system and the interim system are the size of the two secondary tanks, content of all treatment tanks and the handling of the contaminated air stream. The two secondary tanks are 1,200 gallon steel tanks. The first of these two tanks will be full of a mat matrix to increase the surface area for organisms to grow on. The second of these two tanks will contain carbon as the matrix for organism growth. The 12,000 gallon tank will also be filled with the mat matrix to enhance organism growth.

The contaminated recovery system air effluent will be piped in through diffusers in the bottom of the 12,000 gallon tank for optimum removal of hydrocarbons. From there it will be forced through both of the 1,200 gallon tanks for final removal of contaminants. The liquid effluent flow will still enter first into the 12,000 gallon tank then through the two 1,200 gallon steel tanks in series. The first 1,200 gallon tank will contain the mat matrix and the second will contain the carbon.

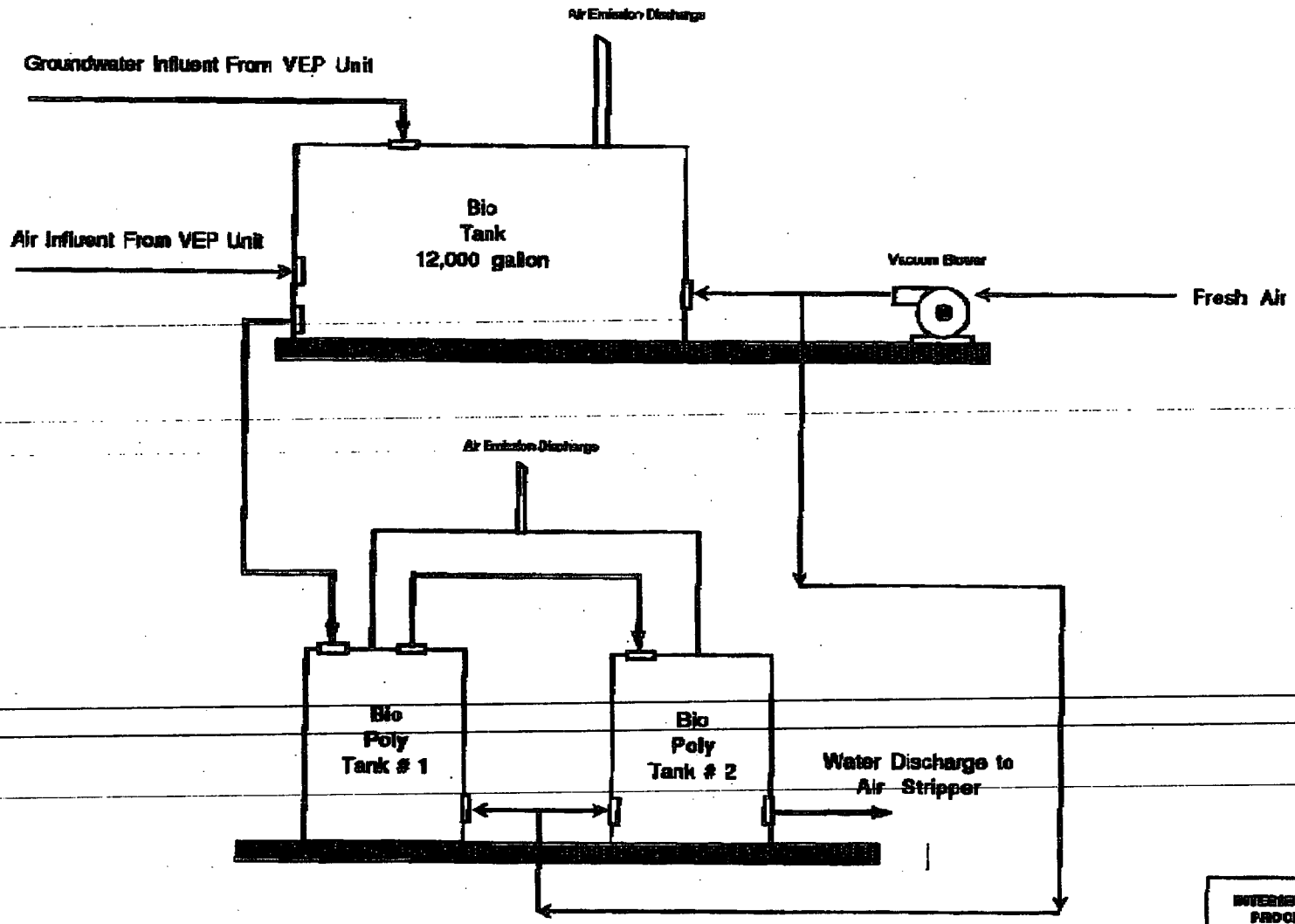
4.2 Operation and Monitoring

All recovery system air effluent will pass through the biological treatment system reducing the contaminant concentrations to levels acceptable for direct discharge without additional treatment. Air samples will be collected periodically to monitor the effectiveness of the treatment system and aid in any adjustments in the process flow.

The recovery system water flow will also be monitored at several points to measure the effectiveness of the biological treatment system in removing contaminants. The analytical results will be used to insure that the required contaminant levels for discharge to the POTW are met as well as to make adjustments in the treatment system to optimize operation.

FIGURES

DRAWN BY		CHECKED BY			DRAWING NUMBER
		APPROVED BY			

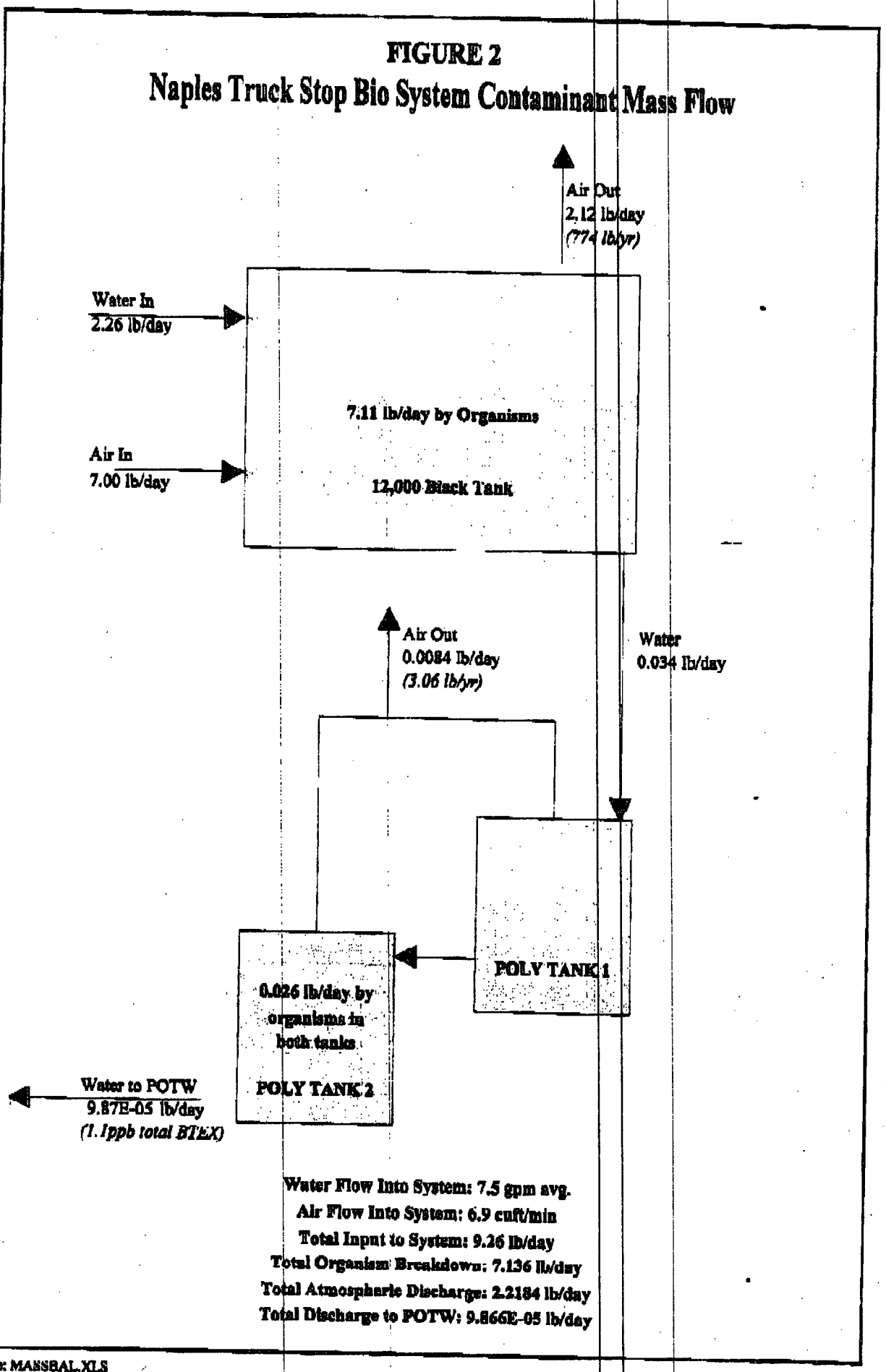


INTERIM BIOLOGICAL SYSTEM
PROCESS FLOW DIAGRAM
FIGURE 1

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 2
Naples Truck Stop Bio System Contaminant Mass Flow



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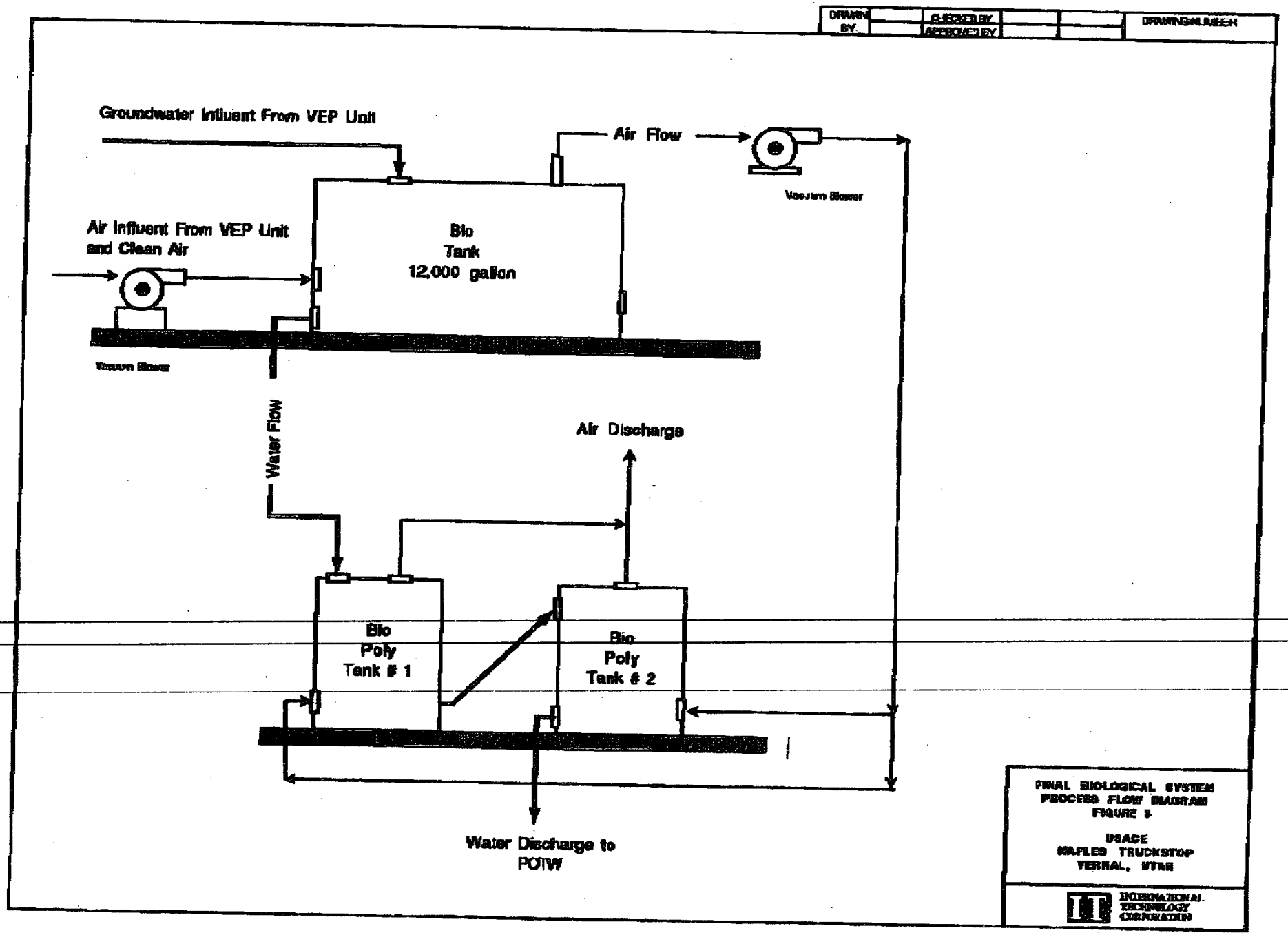

APPENDIX A

Water Contaminant Concentrations

Sample Location	System Influent		Mid Bio Flow		Bio Effluent		Trip Blank	
Sample Tag Number	SYSEFF1		BLKEFF1		POLYEFF1		Trip Blank	
Lab ID Number	B4-08-261-03		B4-08-261-01		B4-08-261-02		B4-07-370-04	
Location Description	Bio System Influent		Midpoint Bio Flow		Bio System Effluent		Trip Blank	
Sample Date	8/12/94		8/12/94		8/12/94		8/5/94	
Time	16:30		16:20		16:40		18:00	
Units	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.
Method(s)	EPA8020		EPA8015_MOD		EPA8020		EPA8020	
Benzene	11000	100	150	2	*ND*	1	*ND*	1
Toluene	8000	100	120	2	*ND*	1	*ND*	1
Ethylbenzene	850	100	12	2	*ND*	1	*ND*	1
Xylenes, total	5400	100	95	2	1.1	1	*ND*	1
BTEX total	25250		377		1.1		*ND*	
TPH - Low Boilers (mg/L)								
Gasoline	N/A		N/A		N/A		*ND*	0.1

Air Contaminant Concentrations

Sample Location	System 1 Air Eff.		Blk Tank Air Eff..		Poly Tank Air Eff..		SYSTEM BLANK		
Sample Tag Number	SYSEFF1		BLKEFF1		POLYEFF1		SYSTEM BLANK		
Lab ID Number	AB7155		AB7156		AD6108		ABLKE7		
Location Description	System 1 Air Eff.		Blk Tank Air Eff..		Poly Tank Air Eff..		SYSTEM BLANK		
Sample Date							N/A		
Sample Time							N/A		
Analysis Date	8/26/94		8/29/94		8/29/94		8/26/94		
Method(s)	TO-14		TO-14		TO-14		TO-14		
dilution	1:114038		1:635.7		1:601.5		1:1		
Units	ppb (V/V)	Det. Lim.	ppb (V/V	Det. Lim.	ppb (V/V)	Det. Lim.	ppb (V/V)	Det. Lim.	MOL. WT.
CAS # Compound									
71-43-2 Benzene	850000	23000	23000	130	250	120	*ND*	0.2	78
108-88-3 Toluene	740000	23000	16000	130	1400	120	*ND*	0.2	92
100-41-4 Ethylbenzene	86000	23000	2400	130	480	120	*ND*	0.2	106
ITS-30-5 m/p- Xylene	370000	23000	10000	130	2700	120	*ND*	0.2	106
95-47-6 o- Xylene	790000	23000	3100	130	720	120	*ND*	0.2	106
108-67-8 1,3,5-Trimethylbenzene	18000	23000	1100	130	380	120	*ND*	0.2	120
95-63-6 1,2,4-Trimethylbenzene	50000	23000	2900	130	1300	120	*ND*	0.2	120

Water Flow Rates

DATE	TIME	TOTALIZ (gal.)	Daily Diff. (gal.)	Avg. Flow (gpm)
8/10/94	17:25	2998827	20235	6.9
8/11/94	7:55	3007387	8560	9.8
8/12/94	7:45	3014666	7279	5.1
8/13/94	9:30	3021558	6892	4.5
8/13/94	15:00	3026329	4771	14.5
	= Time interval of test		AVG. Flow=	7.5

Source	(ug/L)	(lb/gal)	(lb/min)	(lb/day)
BTEX In	25250	2.11E-04	0.00157276	2.2648
BLK EFF	377	3.15E-06	2.3482E-05	0.03381
POLY EFF	1.1	9.18E-09	6.8516E-08	9.866E-05

Air Flow Rates

SOURCE	DIA. (in)	VEL. (ft/min)	Flow Rate (cuft/min)
Recov. Sys	6	35	6.9
Black Tank	4	1250	109.1
Poly Tanks	6	15	2.9

AIR FLOW — Recov. System Effluent

	(lb/min)	(lb/hr)	(lb/day)
Benzene	0.001183	0.0710073	1.7041752
Toluene	0.001215	0.0729137	1.7499283
Ethylbenzene	0.000163	0.0097632	0.2343177
m/p- Xylene	0.000700	0.0420046	1.0081109
o- Xylene	0.001495	0.0896855	2.152453
1,3,5-Trimethylbenzene	0.000039	0.0023134	0.0555206
1,2,4-Trimethylbenzene	0.000107	0.006426	0.154224
TOTAL	0.004902	0.294114	7.058730

AIR FLOW — Black Tank Effluent

(lb/min)	(lb/hr)	(lb/day)
0.0005083	0.030498	0.731952
0.0004171	0.025024	0.600576
7.208E-05	0.0043248	0.1037952
0.0003003	0.01802	0.43248
9.31E-05	0.0055862	0.1340688
0.0000374	0.002244	0.053856
0.0000986	0.005916	0.141984
0.001527	0.091613	2.198712

AIR FLOW — Poly Tank Effluent

	(lb/min)	(lb/hr)	(lb/day)
Benzene	1.492E-07	8.951E-06	0.0002148
Toluene	9.853E-07	5.912E-05	0.0014189
Ethylbenzene	3.892E-07	2.335E-05	0.0005605
m/p- Xylene	2.189E-06	0.0001314	0.0031528
o- Xylene	5.838E-07	3.503E-05	0.0008407
1,3,5-Trimethylbenzene	3.488E-07	2.093E-05	0.0005023
1,2,4-Trimethylbenzene	1.193E-06	7.16E-05	0.0017185
TOTAL	0.000006	0.000350	0.008409

DRAFT

Interim Groundwater Recovery and Treatment System Operation and Maintenance Manual Naples Truck Stop Vernal, Utah

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Table of Contents

Table of Contents *(continued)*

List of Figures

List of Appendices

1.0 Introduction

1.1 General Description

The Naples Truck Stop is located on U.S. Route 40 in Naples, Utah. The Interim Groundwater Recovery and Treatment System (IGRTS) is designed to recover groundwater and soil vapor impacted by gasoline which has leaked from an underground pipeline located on the Naples Truck Stop property. The main focus of the recovery activities is on the property of the Questar Pipeline Company, located adjacent to the Naples Truck Stop. The IGRTS consists of ten recovery wells located on Naples Truck Stop and Questar Pipeline property, two vacuum enhanced pumping systems to recover groundwater and vapor from these wells, and a biological treatment system to remove volatile organic compounds (VOC) from the liquid and vapor prior to discharge.

The treatment is required prior to discharge in order to meet discharge limitations set by the Ashley Valley Water and Sewer Improvement District for discharge of water to the storm sewer and the Utah Department of Air Quality for discharge of vapor to the atmosphere. The discharge requirements are:

Liquid	Less than 25 mg/L of VOCs and Oil & Grease pH greater than 5.5
Vapor	Less than 2,000 pounds of VOCs per year (for operation without an air discharge permit)

Sampling and monitoring requirements are described in greater detail in Chapter 4.0 of this manual. A copy of the Publicly Owned Treatment Works (POTW) discharge permit issued by the Ashley Valley Water and Sewer Improvement District is included in Appendix A.

Recovery Well RW-1 is a 6-inch stainless steel well, with a total depth of 17 feet, and a screened interval of 10 feet. The remaining recovery wells are 4-inch polyvinyl chloride (PVC) wells, with total depths ranging from 16 to 19 feet, and screened intervals of 10 feet (RW-2 through RW-6) and 15 feet (RW-7 through RW-10) from the bottom. Figure 1 is a site plan showing the locations of the recovery wells and the system underground piping arrangement.

Vapor and liquid are extracted from the recovery wells by two vacuum enhanced pumping (VEP) systems. Each VEP system consists of a vacuum pump, an air/water separation tank, a water transfer pump, and a seal water recycle tank. Liquid and vapor are transferred from the two VEP systems to the biological treatment system, for removal of VOCs. The biological treatment system consists of two biological reactors, a fluidized activated carbon adsorber, a nutrient feed system, two blowers, an effluent holding tank, and an effluent transfer pump.

With the exception of the 12,000-gallon biological reactor tank, all of the equipment is located indoors. All of the indoor equipment is located in the treatment building, with the exception of the nutrient feed system which is in the adjacent control shed. The layout of the equipment in the treatment building is shown in Figure 2. Process and instrumentation diagrams (P&IDs) for the IGRTS are presented in Figures 3, 4, and 5.

The system is designed to operate automatically with intermittent supervision by an operator. The system is equipped with an autodialer that will call the system operator or any other relevant telephone numbers in the event of a system failure or other alarm condition. Control panels for the extraction and treatment system equipment are mounted in a wooden building adjacent to the treatment building. The NEPCCO Control Panel Skid (NCP) controls the two VEP systems, and panel CP-1 controls the remaining equipment.

1.2 Document Purpose

The purpose of this operation and maintenance (O&M) manual is to provide normal operating conditions and troubleshooting and maintenance guidelines for the IGRTS at the Naples Truck Stop site. The manual contains log sheets to aid operators in tracking system performance and maintenance (Appendix B). The completed sheets should be maintained at the site with this manual. Detailed vendor information on the equipment and instrumentation used in the system is located in Appendix C of this manual.

Site personnel are expected to become familiar with this manual and to consult it when questions arise. This manual should be maintained on file at the site and be available to anyone responsible for operating or repairing the system.

1.3 General Safety Concerns

The primary safety concerns associated with the operation and maintenance of this system are exposure to the organic compounds in the groundwater and the potential for explosion presented by the organic vapors. The impacted groundwater may be harmful if ingested or absorbed through the skin. It is recommended that site personnel wear gloves while performing any tasks that may involve contact with impacted groundwater. After any contact with these solutions, hands and any wetted skin should be washed with soap and water as soon as possible.

Personnel should also avoid inhaling vapors in the treatment building. The treatment building and the control shed are equipped with ventilation fans and louvers. The ventilation fans in the buildings should be operating while the operator is working at the site.

Maintenance work being performed on electrical equipment or instrumentation must be done after shutting off and locking out power to the equipment or instrument. Because the treatment building is classified as a Class 1, Division 1, explosive area, only explosion-proof and non-sparking tools may be used in the building. All electrical components inside the buildings are designed to meet these requirements.

2.0 Component Descriptions

2.1 Recovery Wells

Groundwater, and vapor are extracted from ten recovery wells (RW-1 through RW-10); eight of these wells are located on the property of Questar Pipeline and two of the wells are on Naples Truck Stop property. The wells are connected to the vacuum enhanced pumping systems (located in the treatment building) by 2- and 3-inch underground schedule 40 PVC pipe, as shown in Figure 1. The sump pump located in the treatment building sump is also included in this section of the O&M manual.

2.1.1 Equipment and Instrumentation Nomenclature

The following is a list of abbreviated names for the equipment and instrumentation included in this section:

Equipment/Instrumentation Item	Name
Recovery well 1	RW-1
Vacuum indicator at RW-1	VI-001
Recovery well 2	RW-2
Vacuum indicator at RW-2	VI-002
Recovery well 3	RW-3
Vacuum indicator at RW-3	VI-003
Recovery well 4	RW-4
Vacuum indicator at RW-4	VI-004
Recovery well 5	RW-5
Vacuum indicator at RW-5	VI-005
Recovery well 6	RW-6
Vacuum indicator at RW-6	VI-006
Recovery well 7	RW-7
Vacuum indicator at RW-7	VI-007
Recovery well 8	RW-8
Vacuum indicator at RW-8	VI-008
Recovery well 9	RW-9
Vacuum indicator at RW-9	V-009
Recovery well 10	RW-10
Vacuum indicator at RW-10	VI-010
Sight glass on the line from RW-9 and RW-10	SG-001
Sight glass on the line from RW-4, RW-5, and RW-6	SG-002
Sight glass on the line from RW-7 and RW-8	SG-003
Sight glass on the line from RW-1, RW-2, and RW-3	SG-004
Control panel for the biological treatment system	CP-1
Building sump pump	P-4
High-high level switch in building sump	LSHH-501
Indicating light for high-high level in building sump (CP-1)	LT-501

2.1.2 Operating Description

The streams from recovery wells RW-4, RW-5, and RW-6 are combined in a 3-inch header which is connected to another 3-inch header from wells RW-9 and RW-10 inside the treatment building. The common line discharges into the air/water separator tank located on VEP skid No. 1. The streams from RW-1, RW-2, and RW-3 are combined in a 2-inch header

which is connected to a 3-inch header from RW-7 and RW-8 inside the treatment building. This common line discharges into the air/water separator tank located on VEP skid No. 2.

The flow from each well is controlled by adjusting the vacuum applied to the recovery pipe entering that well using the gate valve located at the well head. The vacuum on the line is displayed on a vacuum indicator located at the well head. Under certain circumstances, the vacuum applied to a given well casing differs from the vacuum on the recovery line entering the well casing. The vacuum applied to the well casing can be measured by attaching a portable manometer to the fitting on the well casing at the well head.

During normal operation, the building sump pump (P-4) operates automatically. When the selector switch for the pump (located on CP-1) is set to the "AUTO" position, the operation of the pump is controlled by the float connected to the switch on the pump. The pump transfers water from the building sump to the lead biological reactor influent line. If the water level in the building sump reaches a high-high level, an indicating light on CP-1 will be illuminated, and the "Biological Treatment System Shutdown" (BTSS) contacts will be activated. This set of contacts signal NCP to shut down both vacuum extraction systems.

2.1.3 Interlocks

There are no electrical interlocks associated with the recovery wells or the building sump pump.

2.1.4 Alarms

Below is a summary of the recovery well and building sump conditions for which alarms are set to activate:

Condition	Alarm
High-high water level in the building sump	- Building sump high-high level alarm light on CP-1. - Activates autodialer Alarms 1, 2, and 3.

2.1.5 System Start-up

Start-up of the building sump pump consists of the following step-by-step instructions:

- Verify that the ball valve on the discharge of P-4 is open.

- Verify that the selector switch for P-4 (located on CP-1) is in the "AUTO" position.

Start-up of the recovery well system consists of the following step-by-step instructions:

- Verify that the gate valve at each well head is closed.
- Open the ball valve on the header from the recovery wells RW-1, RW-2, and RW-3, entering VEP system No. 2. Close the ball valves on the other three headers.
- Start-up VEP system No. 2 (see Section 2.2.5).
- Open the gate valve at the well head of RW-1 all the way.
- Allow the VEP system to draw water from RW-1 until the water level in the well reaches the bottom of the recovery pipe in the well and air begins entering the pipe (as seen in the local sight glass). The water will now be drawn up the recovery pipe in slugs (i.e., "slugging").
- Measure the vacuum on the well casing using a portable manometer.
- Open the gate valve at the well head of RW-2 all the way.
- Throttle (slightly close) the gate valve on the recovery line from RW-1 to increase the amount of vacuum on the recovery line in RW-2.
- Allow the VEP system to draw water from RW-2 until the water level in the well reaches the bottom of the recovery pipe in the well and begins slugging (as seen in the local sight glass).
- Adjust the gate valve in the recovery line from RW-1 such that water is slugging in the recovery lines from both wells.
- Measure the vacuum on both well casings using a portable manometer.
- Open the gate valve at the well head of RW-3 all the way.
- Throttle the gate valve on the recovery line from RW-2 to increase the amount of vacuum on the recovery line in RW-3.

- Allow the VEP system to draw water from RW-3 until the water level in the well reaches the bottom of the recovery pipe in the well and begins slugging (as seen in the local sight glass).

- Adjust the gate valves in the recovery lines of each well that is on-line such that water is slugging in the recovery lines from each well.

- Measure the vacuum on the casing of each well that is on-line using a portable manometer.

- Continue to bring each of the recovery wells on-line one at a time in this manner. Bring the remaining wells on-line in the following order: RW-4, RW-5, RW-6, RW-9, RW-10, RW-7, and RW-8.

- When all ten wells are on-line and slugging, the system is considered to be balanced.

2.1.6 System Shutdown

The recovery wells and building sump pump system can be operated around the clock, 365 days a year. During normal operation, the system will be shut down only for maintenance. The following are step-by-step instructions for shutdown of the recovery well system:

- Shut down the VEP systems (see Section 2.2.6).

- Close the ball valves on the four headers from the recovery wells, located inside the treatment building.

- Close the gate valves on the recovery lines at each well head.

The recovery wells can be shut down individually, in groups or completely. The building sump pump can be left in the "Auto" mode when the recovery wells are shut down. The following are step-by-step instructions for shutdown of the treatment building sump pump:

- Place the selector switch for P-4 (located on CP-1) in the "OFF" position.
- Close the ball valve on the discharge of P-4.

2.1.7 Troubleshooting

In the event that the building sump pump does not start when the water level in the sump rises above the stainless steel float, the rod on which the float is attached may be stuck. This

should be check by manually raising and lowering the float. The handswitch for the pump (located on CP-1) and the isolation valve on the pump discharge line should be checked to verify that they are in the proper positions in the event of a problem with the pump.

In the event that a problem is suspected with the extraction system, the VEP systems should be thoroughly inspected for trouble (See Section 2.2.7). If the problem is not associated with the VEP systems, the piping in each recovery well head should be inspected for leaks or signs of blockage. The valves and vacuum indicators in the well heads should also be checked for problems.

2.1.8 Maintenance

The following is a list of recommended maintenance actions associated with the recovery wells:

- Monthly, inspect piping in the well heads for leaks.
- Monthly, record the vacuum levels in the recovery lines from each well and on each well casing. Adjust gate valves as necessary to adjust vacuum to the set point determined during start-up.

2.2 Vacuum Enhanced Pumping Systems

Two VEP systems are used to recover groundwater and soil vapor from the ten recovery wells at the site. Based on the yield of the various wells, the system is configured such that each VEP system draws from five recovery wells. VEP system No. 1 draws groundwater and vapors from recovery wells RW-4, RW-5, RW-6, RW-9, and RW-10; VEP system No. 2 draws groundwater and vapors from RW-1, RW-2, RW-3, RW-7, and RW-8.

The two VEP systems consist of the same components: a vacuum pump, an air/water separator tank, a water transfer pump, and a seal water recycle tank. The VEP systems also operate identically. The groundwater and soil vapor recovered by the VEP system are separated in the air/water separator tanks. The water transfer pumps, submersible pumps located in the air/water separator tanks, transfer water to the biological treatment system. Water from the seal water recycle tanks is drawn into the suction line of the vacuum extraction pumps to act as clean seal water. Seal water is necessary for the pumps to operate and to prevent damage which can result from running dry.

2.2.1 *Equipment and Instrumentation Nomenclature*

The following is a list of abbreviated names for the equipment and instrumentation included in this section:

Equipment/Instrumentation Item	Name
NEPCCO control panel skid for VEP systems Nos. 1 and 2	NCP
Air/Water separator tank on VEP skid No. 1	T-1
Water transfer pump in T-1	P-1
Light indicating status of P-1 (NCP)	LT-101
Vacuum indicator on inlet to T-1	VI-101
Low level switch in T-1	LSL-101
High level switch in T-1	LSH-101
High-high level switch in T-1	LSHH-101
Pressure indicator on discharge of P-1	PI-001
Seal water recycle tank on VEP skid No. 1	T-2
Low-low level switch in T-2	LSLL-102
Low level switch in T-2	LSL-102
High level switch in T-2	LSH-102
High-high level switch in T-2	LSHH-102
T-1/T-2 level alarm light (NCP)	LT-103
Light indicating status of solenoid valve on inlet to T-2 (NCP)	LT-105
Vacuum pump on VEP skid No. 1	VP-1
Light indicating VP-1 status (NCP)	LT-102
Vacuum indicator on VP-1 inlet	VI-102
Temperature element for VP-1	TE-101
Temperature indicator for VP-1	TI-101
Light indicating high temperature at VP-1 (NCP)	LT-104
Cartridge filter in the line between T-2 and VP-1	F-1
Flow regulator in the line between T-2 and VP-1	FR-101
Air/water separator tank on VEP skid No. 2	T-3
Water transfer pump in T-3	P-2
Light indicating status of P-2 (NCP)	LT-201
Vacuum indicator on outlet of T-3	VI-201
Low level switch in T-3	LSL-201
High level switch in T-3	LSH-201
High-high level switch in T-3	LSHH-201
Seal water recycle tank on VEP skid No. 2	T-4
Low-low level switch in T-4	LSLL-202

Equipment/Instrumentation Item	Name
High-high level switch in T-4	LSHH-202
T-3/T-4 level alarm light (NCP)	LT-203
Vacuum pump on VEP skid No. 2	VP-2
Light indicating VP-2 status (NCP)	LT-202
Vacuum indicator on VP-2 inlet	VI-202
Temperature element for VP-2	TE-201
Temperature indicator for VP-2	TI-201
Light indicating high temperature at VP-2 (NCP)	LT-204
Cartridge filter in the line between T-4 and VP-2	F-2
Flow regulator in the line between T-4 and VP-2	FR-201

2.2.2 Operating Description

The two VEP systems operate in the same way with a few minor exceptions. This section provides the basic operating philosophy of one VEP system. The differences between the two VEP systems are pointed out where applicable.

The vacuum extraction pump draws groundwater and soil vapors into the air/water separator tank by placing the tank under a vacuum. The extraction piping from the wells is placed under a vacuum by opening the isolation valve in the line between the recovery wells and the air/water separator tank. The vapors from the air/water separation tank are drawn off the top of the tank by the vacuum extraction pump and are discharged into the seal water recycle tank.

Water is transferred from the air/water separator tanks to the lead biological reactor by a submersible pump located in the tank. During normal operation, the selector switch for the pump is placed in the "AUTO" position. The operation of the water transfer pump is controlled by level switches in the air/water separator tank. The operating status of the water transfer pump is indicated by a light on NCP. The discharge pressure of P-1 is displayed on a pressure indicator on the water line coming from T-1. There is not pressure indicator on the discharge of P-2.

Water from the seal water recycle tank is pulled by vacuum through a cartridge filter to the inlet of the vacuum pump. The flow from the tank to the vacuum pump is regulated by a flow regulator located downstream of the cartridge filter in the 3/4-inch line. The seal water

recycle tanks (T-2 and T-4) are filled manually by connecting a hose from the city water connection located outside, along the North wall of the treatment building to the solenoid valve on T-2. During filling operations, the selector switch for the solenoid valve (located on NCP) is placed in the "AUTO" position. The water level in T-2 is equalized with the level in T-4 via a 1-inch line connecting the two tanks. The solenoid valve remains open until the water level in T-2 reaches the high level switch. When the valve is open, the indicating light for the valve on NCP is illuminated.

During normal operation, the selector switch for the vacuum pump (located on NCP) is placed in the "AUTO" position. In the AUTO mode, the vacuum pump will shut down if the water level reaches the high-high level probe in the air/water separator tank or the high-high or low-low probe in the seal water recycle tank. The vacuum pump will also shut down automatically if the temperature of the pump exceeds a high temperature set point (160°F). Both vacuum pumps will shut down if the liquid level in the treatment building sump reaches the high-high level switch or if a high-high liquid level occurs in any of the tanks associated with the biological treatment system (T-5 through T-8).

The operating status of each vacuum pump and water transfer pump is indicated by a light on NCP. Two level alarm lights on NCP (one for each system) indicate whether a level-related alarm has occurred. Two high temperature alarm lights on NCP indicate whether the temperature of the vacuum pumps has risen above 160°F and caused a shutdown. The temperature of each vacuum pump is displayed on a local digital temperature indicator on the VEP skids. Vacuum gauges are installed on the inlet of each vacuum pump, the inlet of T-1, and the vapor outlet of T-3.

2.2.3 Interlocks

The following is a list of the safety control and operational interlocks which govern the operation of the electrical equipment in the VEP systems:

Condition	Interlock
High-high level in T-1 or T-2	- Stops VP-1
Low-low level in T-2	- Stops VP-1
High temperature at VP-1	- Stops VP-1

Condition	Interlock
High/low level in T-1	- Starts/stops P-1
High-high level in T-3 or T-4	- Stops VP-2
Low-low level in T-4	- Stops VP-2
High temperature at VP-2	- Stops VP-2
High/low level in T-3	- Starts/stops P-2
Low/high level in T-2	- Opens/closes solenoid valve in city water feed line to T-2
BTSS contacts close (CP-1)	- Stops VP-1 and VP-2.

2.2.4 Alarms

The following is a list of alarms associated with VEP systems. All of the alarm lights listed are located on NCP. Each of the alarms listed below activates Alarm 1 on the autodialer in addition to illuminating the alarm light.

Condition	Alarm
High-high level in T-1 or T-2, or Low-low level in T-2	- VEP Skid 1 level alarm light (LT-103)
High temperature at VP-1	- VP-1 high temp. alarm light (LT-104)
High-high level in T-3 or T-4, or Low-low level in T-4	- VEP Skid 2 level alarm light (LT-203)
High temperature at VP-1	- Vp-2 high temp. alarm light (LT-204).

2.2.5 System Start-up

Start-up of VEP systems consists of the following step-by-step instructions:

- Verify that the following valves are closed:
  - Gate valve and ball valve in the line connecting T-1 and T-2 on skid 1

- Ball valves on the drains of T-1, T-3, and T-4

- Ball valve on the city water connection to T-2

- Ensure that the following valves are open:

  - Butterfly valve on the inlet to T-1
  - Butterfly valve on the vapor outlet of T-3
  - Gate valves on the discharge lines from P-1 and P-2
  - Ball valves on the water and vapor inlets to T-5
  - Ball valve in the line between T-2 and the inlet of VP-1
  - Ball valve in the line between T-4 and the inlet of VP-2
  - Ball valve on the line between T-2 and T-4

- Verify that the seal water tanks are full; fill as needed (see Section 2.2.8).

- Verify that all sample ports and drain valves between the VEP systems and the biological treatment system are closed.

- Verify that the selector switch for the solenoid valve on the city water inlet to T-2 (at NCP) is in the "OFF" position.

- Place the selector switch for P-1 (at NCP) in the "AUTO" position.

- Place the selector switch for P-2 (at NCP) in the "AUTO" position.

- Start the blowers in the biological treatment system (see Section 2.3.5).

- Place the selector switch for VP-2 (at NCP) in the "AUTO" position.

- Bring wells RW-1, RW-2, RW-3, RW-7, and RW-8 on line (see Section 2.1.5)

- Place the selector switch for VP-1 (at NCP) in the "Auto" position.

- Bring wells RW-4, RW-5, RW-6, RW-9, and RW-10 on line (see Section 2.1.5)

- Set FR-101 and FR-201 to 8 gpm.

- Adjust the gate valve on the air vent on each VEP skid until the vacuum gauge on each vacuum pump suction line reads approximately 25 in. Hg.

2.2.6 System Shutdown

The VEP systems are designed to operate around the clock, 365 days a year. During normal operation, the system will be shut down only for maintenance. The system is shutdown by placing the selector switches (at NCP) for VP-1, VP-2, P-1, and P-2 in the "OFF" position. The tanks do not need to be drained unless work is to be performed on the piping or the tanks.

2.2.7 Troubleshooting

Loss of vacuum at the well heads is the most likely operational problem with the system. Should this situation occur, the cause of the problem must be identified and corrected as soon as possible. The system must then be restarted as described in Sections 2.1.5 and 2.2.5 to ensure that all of the recovery wells are balanced. The most probable cause of a loss of vacuum at the wells is the shutdown of one or both vacuum extraction systems. In the event of a vacuum pump shutdown, the operator must check the alarm lights on NCP to find the cause of the alarm.

A high temperature alarm could be caused by a short in the thermocouple attached to the vacuum pump or by process conditions that cause the vacuum pump to overheat. Overheating of the vacuum pump could be caused by a shutdown of blower B-1 or any other situation that creates back pressure on the seal water tanks. The operating status of B-1 and the valves in the vapor lines should be visually inspected to verify that all equipment is properly operating. Section 2.3.7 of the manual describes troubleshooting the blowers in the biological treatment system. Overheating may also be caused by low water levels in the seal water recycle tanks and an elevated temperature in the treatment building.

A level alarm on a VEP skid will also shut down a vacuum pump. The operator must visually check the water level in both tanks on the skid experiencing the problem. If water is being drawn into the air/water separator tank faster than the water transfer pump can transfer it to the lead biological reactor, the level of vacuum on the air/water separator tank must be decreased. This is accomplished by opening the gate valve on the air vent on that skid. The vacuum should be adjusted until the water level in the air/water separator tank is relatively constant to slowly dropping (it must <u>not</u> be rising). If the water level in the tanks appears normal, the level switches should be removed from the stilling wells and manually operated to verify that they are functioning properly. The water transfer pump should be checked in

"HAND" mode to verify that it is not the cause of the level problem. If the level switches are believed to be at fault, they should be serviced by the manufacturer (Appendix C).

A shutdown of the vacuum pumps may also be caused by mechanical problems with the vacuum pumps or the water transfer pumps. The operator should consult the manufacturer's literature in Appendix C if the pumps are operating improperly. Only qualified technicians should service the pumps.

2.2.8 Maintenance

The following is a list of recommended maintenance actions associated with the VEP systems:

- Bi-weekly or as needed, add city water to the seal water tanks (see below).
- Monthly, inspect the piping on the VEP skids for leaks.
- Monthly, record the vacuum levels on the suction line to each vacuum pump to the set points determined during start-up. Adjust gate valves on the air vents as necessary to adjust vacuum to the set points determined during start up.
- Monthly, record the temperature of each vacuum pump.

Makeup water is added to the seal water recycle tanks by connecting a garden hose from the city water tap located outside, along the North wall of the treatment building to the solenoid valve on T-2. The water is turned on at the tap and the solenoid valve is opened by placing the handswitch for the valve (at NCP) in the "AUTO" position. The valves on the line connecting T-2 to T-4 must be open to allow water to enter T-4. When the water level in T-2 reaches the high level switch in the tank, the solenoid valve closes automatically.

2.3 Biological Treatment System

The biological treatment system consists of two air blowers, two biological reactor tanks, a fluidized activated carbon adsorber, an effluent holding tank and pump, and a nutrient feed tank and pump. This equipment is used to treat and discharge the liquid and vapor extracted by the VEP systems.

2.3.1 Equipment and Instrumentation Nomenclature

The following is a list of abbreviated names for the equipment and instrumentation included in this section:

Equipment/Instrumentation Item	Name
12,000-gallon biological reactor (lead reactor)	T-5
High-high level switch in T-5	LSHH-301
Light indicating high-high level in T-5 (CP-1)	LT-304
Blower feeding T-5	B-1
Light indicating the status of B-1 (CP-1)	LT-301
1,200-gallon biological reactor (second reactor)	T-6
High-high level switch in T-6	LSHH-302
Light indicating high-high level in T-6 (CP-1)	LT-305
Blower feeding T-6	B-2
Light indicating the status of B-2 (CP-1)	LT-302
Air flow element on inlet to T-6	FE-301
1,200-gallon fluidized activated carbon adsorber	T-7
High-high level switch in T-7	LSHH-303
Light indicating high-high level in T-7 (CP-1)	LT-306
Air flow element on inlet of T-7	FE-302
Effluent holding tank	T-8
Low level switch in T-8	LSL-304
High level switch in T-8	LSH-304
High-high level switch in T-8	LSHH-304
Light indicating high-high level in T-8 (CP-1)	LT-307
Effluent transfer pump	P-3
Light indicating the status of P-3 (CP-1)	LT-303
Effluent water flow totalizer	FQ-301
Nutrient feed tank	T-9
Nutrient feed pump	P-5

2.3.2 Operating Description

Water is pumped from the air/water separator tanks (T-1 and T-2) to T-5 by the water transfer pumps on the vacuum extraction skids (P-1 and P-2). The biological reactors contain random dump packing and filament packing covered with microorganisms that serve to biologically degrade the organic contaminants in the water. Blower B-1 draws the soil vapors from the

seal water recycle tanks (T-2 and T-4) and discharges them into T-5. Ambient make-up air is added to the vapor stream at the suction of B-1. This ambient air is a source of oxygen for the microorganisms. The vapor stream enters T-5 at a point below the liquid level and is distributed in the tank via two headers running the length of the tank. The liquid and vapor streams travel counter-currently through T-5 in order to improve absorption of the organics into the water.

Blower B-2 transfers the vapors from T-5 to the bottom of T-6 and T-7. The stream is split such that the air flow rate to each tank is equal. The flow rates are balanced using the ball valves and variable area flow meters on the gas inlet lines to the tanks. Ambient make-up air is added to the vapor stream at the suction of B-2.

Water flows by gravity from the bottom of T-5 to the bottom of the second biological reactor (T-6). The water flows upward (with the vapor from B-2) through the filament packing containing the microorganisms in the tank. Water flows by gravity from T-6 to the bottom of the fluidized activated carbon bed (T-7). The biologically active carbon bed serves as a polishing step for the groundwater. Organics are adsorbed onto the carbon and are digested by the microorganisms adhered to the carbon granules. The water from T-7 overflows into the effluent holding tank (T-8). The vapor streams from T-6 and T-7 are combined and discharged to the atmosphere outside the North wall of the treatment building.

During normal operation, the selector switch (at CP-1) for the effluent transfer pump (P-3) is set in the "AUTO" position. Operation of the pump is controlled by the high and low level switches in the T-8. The operating status of P-3 is indicated by a light on CP-1. The pump transfers water from T-8 to the storm sewer system. The discharge flow is totalized by an in-line flow totalizer downstream of P-3.

If a high-high liquid level is detected in any of the tanks in the biological treatment system, the BTSS contacts in CP-1 are activated. This set of contacts is also closed if one of the blowers stops operating or if the building sump high-high level switch is activated. Closure of this set of contacts signals NCP to shut down VP-1 and VP-2.

2.3.3 Interlocks

The following is a list of the safety control and operational interlocks which govern the operation of the electrical equipment in the biological treatment system:

Condition	Interlock
High/low level in T-8	- Starts/stops P-3

2.3.4 Alarms

The following is a list of alarms associated with the biological treatment system. All of the alarm lights listed are located on CP-1. Each of the alarms below activates Alarm 2 on the autodialer.

Condition	Alarm
High-high level alarm in T-5	- T-5 high-high level alarm light (LT-304)
High-high level alarm in T-6	- T-6 high-high level alarm light (LT-305)
High-high level alarm in T-7	- T-7 high-high level alarm light (LT-306)
High-high level alarm in T-8	- T-8 high-high level alarm light (LT-307)
Blower B-1 or B-2 shuts down	- No visible alarm light on panel, run light is no longer lit.

2.3.5 System Start-up

Start-up of the biological treatment system consists of the following step-by-step instructions:

- Record the value on the flow totalizer and the time of system startup.
- Verify that the following valves are open:
  - Two 2-inch ball valves that vent ambient make-up air into the suction lines of blowers B-1 and B-2
  - Two 2-inch ball valves on the vapor inlets to T-5
  - 2-inch ball valve on the water inlet to T-5
  - 4-inch ball valve on the water outlet of T-5

- 1-inch ball valves on either side of the two air flow meters in the vapor influent lines to T-6 and T-7

- Drain valves on the bottom of the demisters.

- Verify that the following valves are closed:

  - 2-inch ball valves on the gas inlet nozzles of T-6 and T-7 (near the bottom of the tanks)

  - 2-inch ball valves in the air influent lines to T-6 and T-7 (in the lines parallel to the air flow meters)

  - Sample valve on the discharge line.

- Place the handswitch for P-3 in the "AUTO" position.

- Place the handswitch for B-1 in the "AUTO" position.

- Place the handswitch for B-2 in the "AUTO" position.

- Slowly open the 2-inch ball valve on the air inlet to T-6 until the flow meter reads 50 cfm.

- Slowly open the 2-inch ball valve on the air inlet to T-7 until the flow meter reads the same flow as the flow meter on T-6.

- Continue to adjust the two valves until one of the valves is fully open and the other is set such that the air flow rate to each tank is equal.

- Start the extraction system (see Sections 2.1.5 and 2.2.5).

2.3.6 System Shutdown

The biological treatment system is designed to operate around the clock, 365 days a year. During normal operation, the system will be shut down only for maintenance. The following are step-by-step instructions for shutdown of the biological treatment system:

- Shut down the extraction system (see Sections 2.1.6 and 2.2.6).
- Place the handswitches for B-1, B-2 and P-3 in the "OFF" position.
- Close the 2-inch ball valves on the air inlets to T-6 and T-7.

2.3.7 Troubleshooting

In the event that the concentration of VOCs in the effluent water or vapors begins to increase, this may indicate a problem with the microorganism population in the reactors. Richards Laboratories (the supplier of the biological treatment system) should be contacted immediately to diagnose the problem and correct it.

In the event that one of the blowers in the biological treatment system or the effluent pump is malfunctioning, the entire system should be shut down and the unit should be repaired. The manufacturer's literature provided in Appendix C gives details on the maintenance that can be performed by the system operator. If the problem persists after following the directions in the manufacturer's literature, the vendor that supplied the unit should be contacted to provide repairs.

If persistent high-high level alarms occur in one of the tanks in the biological treatment system, the level switch should be visually inspected and manually tested for proper operation. A defective level switch must be replaced as soon as possible. The IGRTS should not be operated until the faulty switch is replaced.

2.3.8 Maintenance

The following is a list of recommended maintenance actions associated with the biological treatment system:

- Monthly, inspect the piping for leaks.
- Monthly, record the air flow rates to T-6 and T-7. Adjust the 2-inch ball valves on the air inlets to the tanks as necessary to equilibrate the flow.
- Monthly (or with every visit), record the number on the flow totalizer and the date and time of the recording.

{TO BE ADDED: Nutrient addition description...must discuss with Richards Labs}

3.0 System Control

3.1 General Information

Operation of the IGRTS at the Naples Truck Stop site is semiautomatic. Normal operation consists of placing the system on line and allowing it to operate continuously, with periodic monitoring and adjustments. When an alarm condition arises, the system notifies the operator by activating the autodialer located in CP-1 which calls a pre-programmed phone number and plays a prerecorded message related to the alarm condition.

The autodialer used in this system is a Verbatim Model VBS made by Raco. The autodialer phone number is _____. A manual for the autodialer is provided in Appendix C. This manual gives detailed instructions on use of the autodialer, including how to record messages on the autodialer and how to set the phone numbers to be called.

After an alarm call is received from the autodialer, the person who receives the call must press the "9" button on the phone at the sound of the tone, or call the autodialer back at the above number to acknowledge the alarm. After the alarm has been acknowledged, the autodialer will not call again for one hour for the alarm condition that was acknowledged (it may call for other alarms). If the condition is corrected during this time, the autodialer will not place another call. If the alarm condition still exists, the autodialer will call once per hour until the condition is corrected.

3.2 Alarm One Information

The following is a summary of information regarding Alarm 1 on the autodialer:

Message:	"One or both of the vacuum extraction systems has shut down."
Meaning of the message:	One of the five alarms located on the Nepcco control panel has been activated. This could have been caused by any of the following eight switches being tripped: The high-high level switch on T-1, T-2, T-3, or T-4; the low-low level switch on T-2 or T-4; the high temperature switch on VP-1 or VP-2. It could also be activated by the BTSS contacts being closed in CP-1.

Interlocks:	Depending on which of the eight alarm conditions exist, VP-1 and/or VP-2 would be shut down.
Possible cause No. 1:	Water is entering T-1 at a higher rate than it can be pumped out by P-1 (VP-1 shut down).
Possible cause No. 2:	Water is entering T-3 at a higher rate than it can be pumped out by P-2 (VP-2 shut down).
Possible cause No. 3:	The water level in one of the seal water tanks is too low (VP-1 and VP-2 will shut down).
Possible cause No. 4:	VP-1 or VP-2 is not operating properly, causing it to overheat (VP-1 or VP-2 shut down).
Possible cause No. 5:	An alarm condition has arisen in the biological treatment system (VP-1 and VP-2 shut down). Note: this will also activate Alarm 2 on the autodialer, see below.

3.3 Alarm Two Information

The following is a summary of information regarding Alarm 2 on the autodialer:

Message:	"The biological treatment system has shut down"
Meaning of the message:	One of five high-high level switches has been tripped, or either of the two blowers in the biological treatment system has shut down. The five level switches associated with this alarm are located in T-5, T-6, T-7, T-8, and the building sump. Note: if a message for Alarm 2 is received, a message for Alarm 1 will also be received.
Interlocks:	Any of the alarm conditions above shut down VP-1 and VP-2.
Possible cause No. 1:	The gravity discharge in one of the biological treatment tanks (T-5, T-6, or T-7) is being obstructed.
Possible cause No. 2:	Water is entering the building sump at a higher rate than can be pumped by P-4, either because P-4 is not operating properly, or because the building is in a flood condition.
Possible cause No. 3:	Blower B-1 or B-2 has stopped operating.

3.4 Alarm Three Information

The following is a summary of information regarding Alarm 3 on the autodialer:

Message:	"The building sump has reached a high-high level"
Meaning of the message:	A building flood condition may be occurring. Note: if a message for Alarm 3 is received, messages for Alarms 1 and 2 will also be received.
Interlocks:	This alarm condition shuts down VP-1 and VP-2.
Possible cause No. 1:	Pump P-4 is not operating properly.
Possible cause No. 2:	There is a leak in the process piping or a tank, or water is overflowing one of the tanks, causing a flooded condition in the treatment building.

3.5 Alarm Four Information

The fourth alarm on the autodialer is not being used at this time. It can be used to facilitate system expansion or reconfiguration.

4.0 Sampling and Analysis

Sampling and analysis requirements for the Naples Truck Stop IGRTS are defined by the discharge requirements of the Ashley Valley Water and Sewer Improvement District and the Utah Department of Air Quality. The sampling schedule includes samples required by these agencies as well as those required to evaluate system performance.

During the first two months of operation, liquid grab samples will be collected weekly from the influent to T-5, the effluent of T-6, and the system discharge stream. These water samples will be analyzed for benzene, toluene, ethylbenzene, and total xylene (BTEX) by EPA Method 8020, and gasoline range total petroleum hydrocarbons (TPH) by EPA Method 8015. The pH of the discharge stream sample will also be determined. Also during this period, the system effluent vapors will be monitored weekly for VOCs using a photoionization detector (PID).

After two months of operation, the following sampling schedule will be in effect: grab samples will be collected monthly from the influent stream to T-5 and the system discharge

stream, and analyzed for BTEX and TPH by the EPA methods listed above. The pH of the discharge stream sample will also be determined.

Throughout system operation, samples of the system effluent vapors will be collected quarterly and analyzed for BTEX by EPA Method 8020. For all samples, collection, preservation, and analysis will conform to the guidelines set forth in 40 CFR, Part 136.

Appendix B contains a form to be completed by the operator to keep track of the sampling and analysis requirements.

FIGURES

APPENDICES